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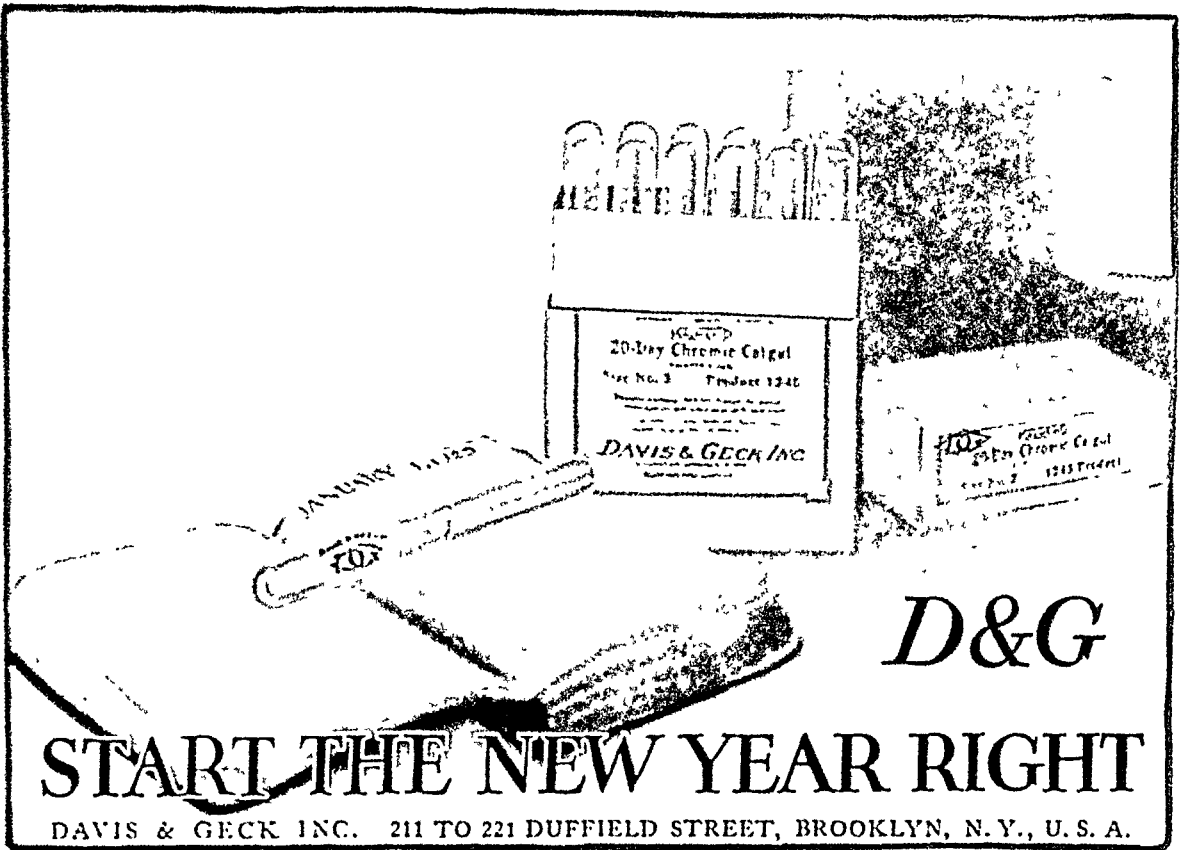
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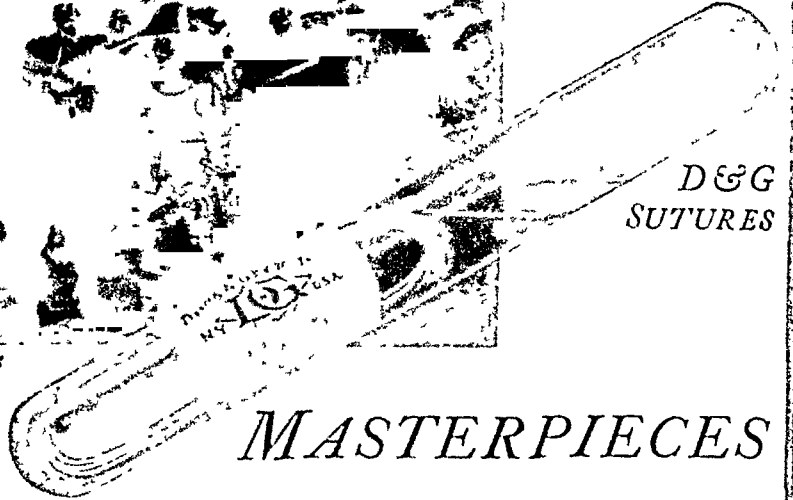
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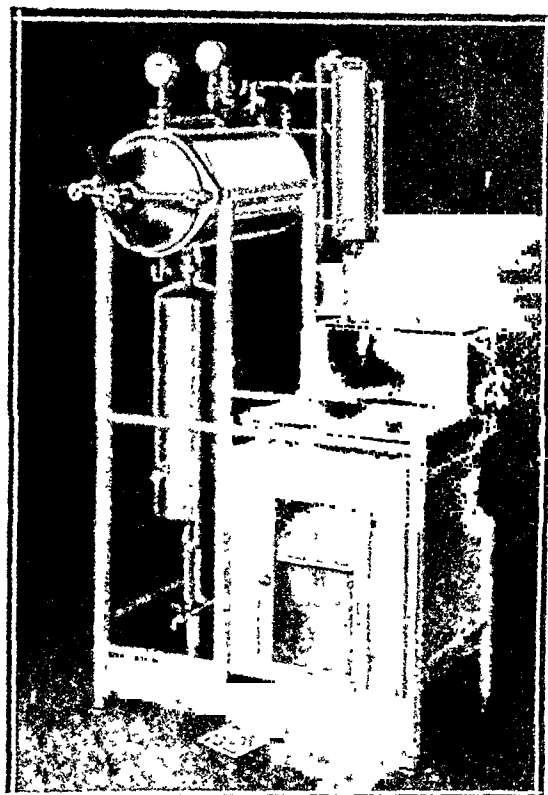
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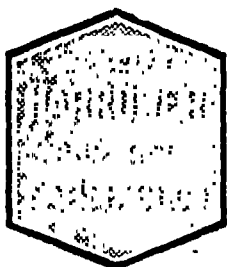
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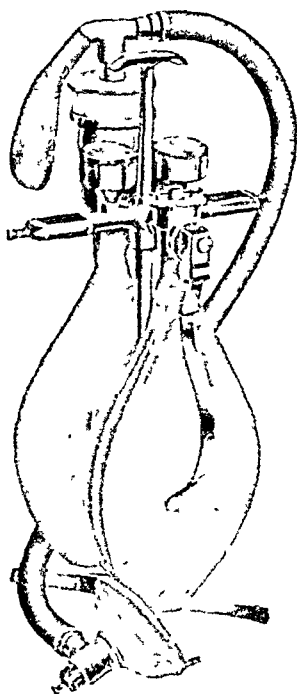
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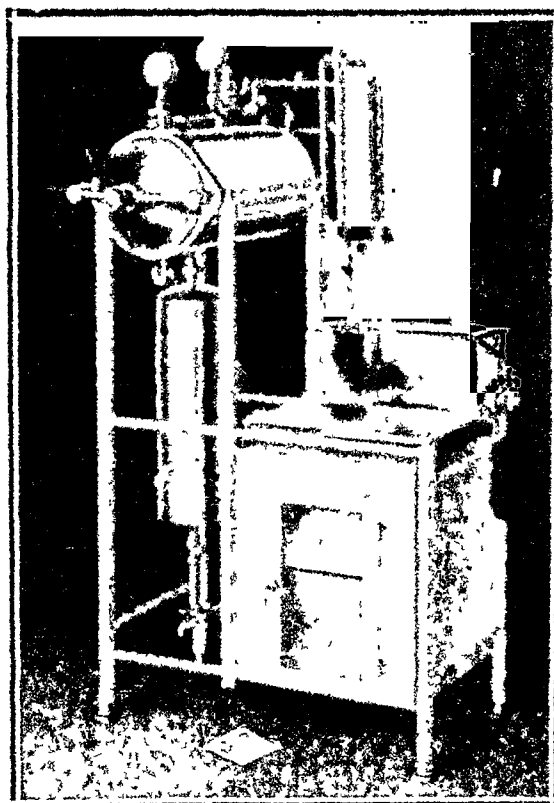
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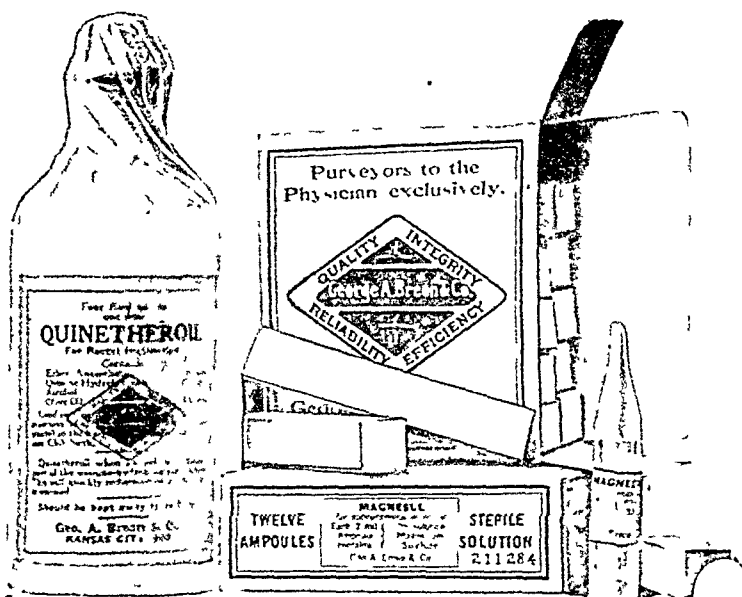
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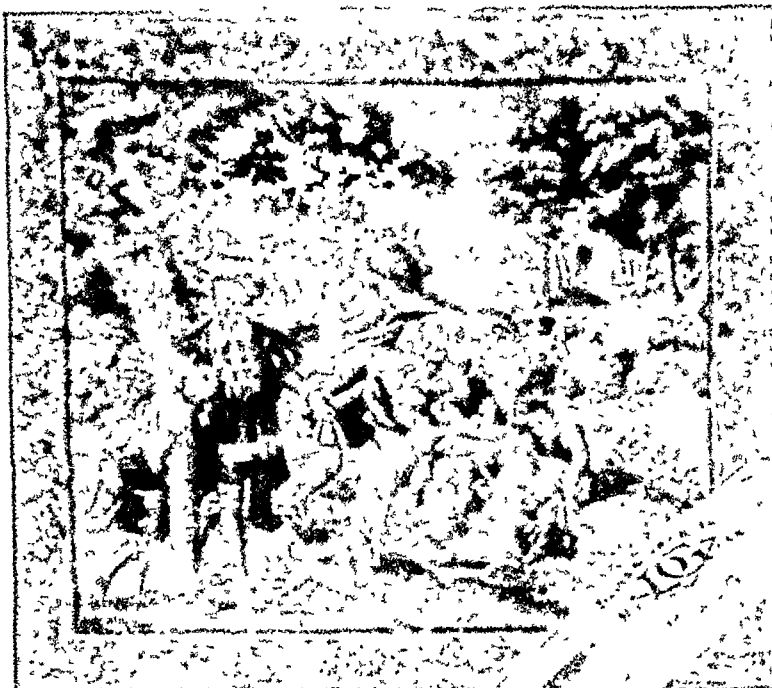
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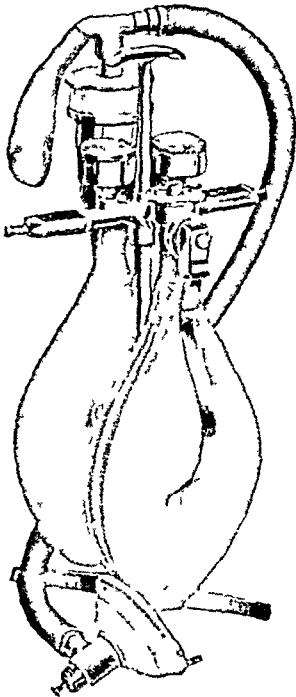
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# The American Journal of Obstetrics and Gynecology

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No. 1

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## Original Communications

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### THE INFLUENCE OF DIET ON LACTATION\*

By FRED L. ADAIR, M.D., MINNEAPOLIS, MINN.

THE question of milk production is one of very great importance, whether it concerns the mammalia in general, the dairy animals, or the human being.

The most vital problem as well as the primary purpose of milk secretion is that of furnishing food to the suckling young of the large group of mammifera. So far as the large group of milk-producing animals is concerned, the primary object of the performing of this function still holds good. This is definitely true of the human species.

There are, however, certain species of animals whose milk supply is particularly abundant and whose organs are so constructed as to make this supply easily available by artificial means. These animals have been used and are being increasingly used for the purpose of obtaining food not only for their own young but also for the offspring of other animals, and especially for human infant, child, and adult.

The commercial development of the dairying industry has been enormous and has been accompanied by considerable research, not only into health problems involved in the handling and distribution of milk, but further, into eugenics, and also into economic questions. The object of the last two mentioned investigations has been to secure the type of animal which, under proper surroundings, care, and diet, would produce the most and the best milk for the least cost.

Many thousands of dollars and enormous amounts of time and energy have been spent in the investigation of these health and, espe-

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\*Read at the Forty-ninth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 15 to 17, 1921.

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

cially, economic problems involved in the dairying industry. This has been done largely because it is a commercial affair and where dollars are involved they are easily secured for purposes of making and saving more dollars. In human beings the milk production has not been and probably will not be commercialized except to a very limited extent.

Human milk production has, however, a very vital interest for the future health and welfare of the human offspring. This self-evident fact, known intuitively by lower animals and less civilized humans, was partially forgotten by their more highly cultured relations, who sought some easier and less exacting means of rearing their offspring. It is now being more and more appreciated that human milk is by far the best and at times almost the sole food which will furnish the requisite suitable nourishment to the young, and perhaps premature or immature infant.

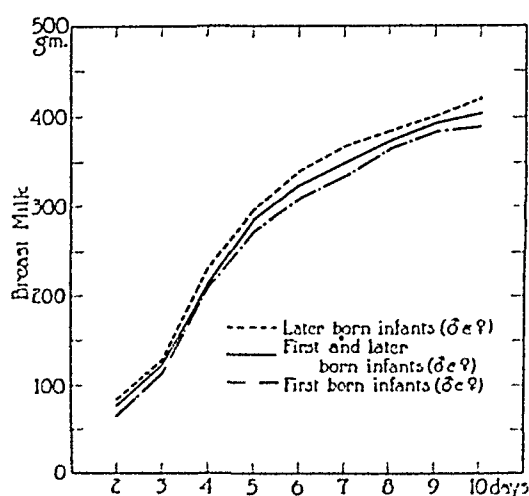


Fig. 1.—Infants' daily breast milk ingestion with mothers on a hospital diet.

In spite of its importance, very little study has been given to the effect of maternal surroundings, care, and food upon the production of human milk. These questions have engrossed the time and attention of dairymen but not that of those occupying their time and energy with the care of human mothers and offspring. Such information as we have is empirical, superficial, and not very scientific. We can, of course, profit to some extent by the work of those who have investigated similar problems in studying the milk production of animals.

Such investigations as have been conducted might be grouped into (1) those done on laboratory animals, (2) those performed upon dairy animals, and (3) those very limited observations which have been made concerning the human mother. It might be well to briefly summarize some of the investigations which have been made in the above mentioned methods.

Ssubotin, in 1866, quoted from various authors and found that most of the experiments had been conducted on herbivorous animals and that the results had been contradictory. Boussingault and la Bel, as cited by the above author, felt that in cows the kind of nutriment had little effect upon the composition of their milk. The quantity of food seemed to them to be of greater importance. Excessive nutriment increased the output of milk as well as that of casein and fat. Scanty feeding had the opposite effect. Thomson, according to Ssubotin, concluded that the kind of nourishment greatly influenced the composition of milk, and that high protein diet increased the milk fat. Playfair was thought to believe that a low protein diet increased the fat content of milk. Von Bensch was quoted as concluding, from his experiments on dogs, that a high protein diet increased the casein of the milk. A vegetable diet decreased the casein but increased the proportion of fat and sugar, which substances were reduced to a minimum on a high protein diet.

Ssubotin himself conducted his three experiments on dogs and concluded that the kind of nourishment had an important influence upon the composition of milk. He found that the increase in fat and the solid constituents was marked on a high protein diet but that the increase in casein was less marked. He believed

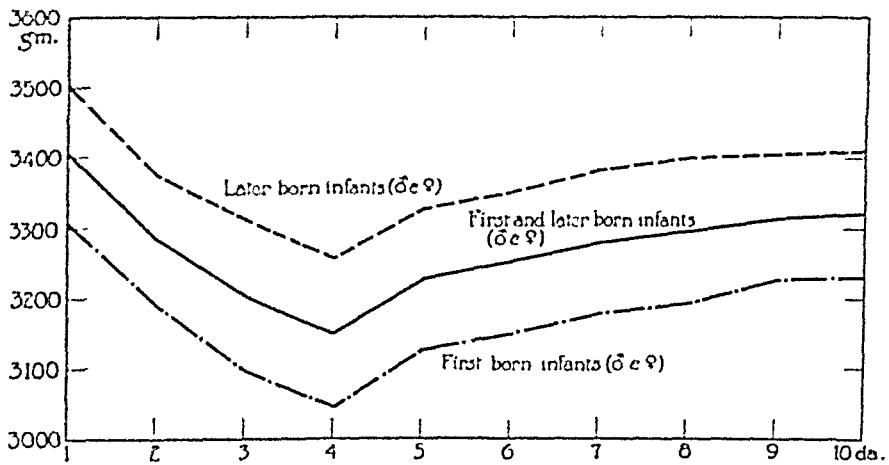


Fig. 2.—Infants' daily weight with mothers on a hospital diet.

this increase to be both actual and relative. The high protein diet also increased the total quantity of milk secretion. It decreased the sugar secretion only about 1 per cent below that of the vegetable diet. The salt content remained about the same on a meat as on a vegetable diet. He found no increase of fat on a vegetable diet, as described by some others.

By a shift from a meat to a vegetable diet he was able to show a decrease of the fat and casein and only a slight increase in the sugar content. In a high fat feeding there was only a relative increase of the solid constituents, and especially of the fat, but there was a corresponding decrease in the sugar. The quantity of milk secreted was markedly diminished on a high fat diet and reappeared on a meat diet.

The author also concluded that milk fat was to a large extent derived from the protein food.

Voit, in 1869, stated that in 1865 he conducted some experiments on a dog to determine the effect of diet upon milk secretion. He believed that while the milk secretion was somewhat independent of food that this was true to only a slight extent. The secretion decreased under starvation but increased again with proper nutrition. He thought it was greatest with abundant protein food, but he did not find the decrease in milk secretion from high fat feeding, as was reported by

Ssubotin. He proved to his own satisfaction that the protein content of milk did not stand in direct relationship to that of the food, but that it increased slightly with a high protein diet and decreased a little during inanition. He believed that the milk sugar content showed only slight variations, being the highest with high protein feeding, and that the amount of carbohydrates ingested had no influence on its secretion. He concluded that the milk secretion does not vary proportionally with the ingredients or the amount of the diet and that milk secretion is dependent first of all upon mammary development.

John and Schick, in 1923, published some careful studies on ten rats during gestation and lactation, and concluded that pregnancy did not increase food consumption but that almost immediately after delivery the consumption of food increased rapidly to more than two and one-half times the normal amount taken. They also found that these quantities taken by normal animals caused digestive disorders.

A large amount of work has been done on dairy animals. It may be of interest to quote from some of the more recent treatises dealing with dairy problems.

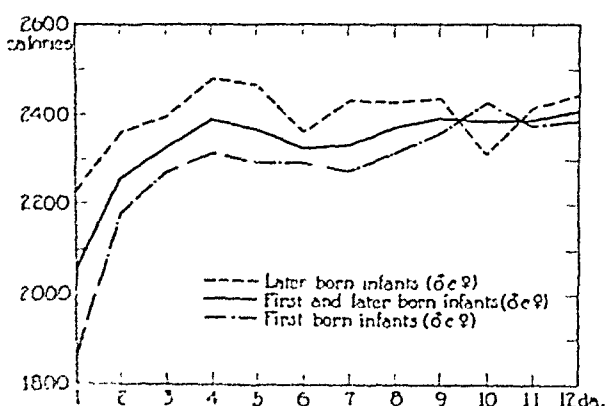


Fig. 3.—Mothers' daily caloric intake when on a high protein diet.

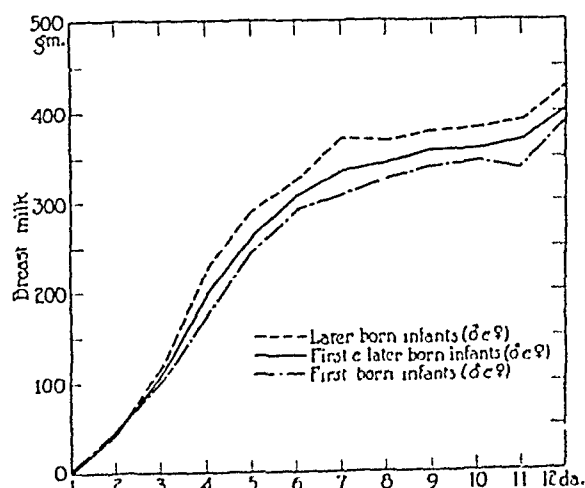


Fig. 4.—Infants' daily breast milk ingestion with mothers on a high protein diet.

Eekles states that "The error is often made of assuming that the richness of milk varies with the feed. While it is possible under certain conditions to make a variation of possibly 0.2 to 0.4 per cent by giving certain feeds, it is only under conditions so abnormal that it is of scientific interest only and has no practical bearing. As far as the ordinary practice is concerned, the feed has no influence upon the richness of the milk. If a certain cow averages 3.4 per cent fat for a year, no one knows how to feed her to make her milk average 4.0 per cent for the following year. The richness of a cow's milk is fixed by heredity and cannot be permanently changed by any means. It is a well-known fact, however, that a cow in a high state of flesh at the time of calving gives richer milk for a short time than does one thin in flesh."

Arnold in his work states that "The factors governing production are essentially the same as in other branches of animal production, viz., the animal, the environment, and the food supply. In milk production, however, the relative importance of the first and second conditions is greater than in other forms of production for the reason that they may materially influence the distribution of the energy fed between milk production and tissue increase."

While the total quantity of milk produced is affected by feed, care, and

other circumstances, the capacity of the animal as a milk producer is an individual characteristic."

"Some animals, by virtue of individual or inherited peculiarities, are able to transform large amounts of excess feed into milk without storing up any considerable portion of it in the form of body tissues. Such animals tend to remain spare in body and if well produce large amounts of milk. They are the typical dairy animals. Other individuals, on the contrary, have a well marked tendency in the opposite direction, viz., toward the production of body tissue. When fed heavily, they utilize the additional feed chiefly in this direction and show little or no tendency toward an increase in milk production. These are typical meat-producing animals. The two types, of course, shade into each other by imperceptible gradations."

Henry and Morrison state that "The amount of milk a cow will produce, and hence the total yield of fat, depends on the feed and care she receives, up to the point where her full capacity for milk production is reached."

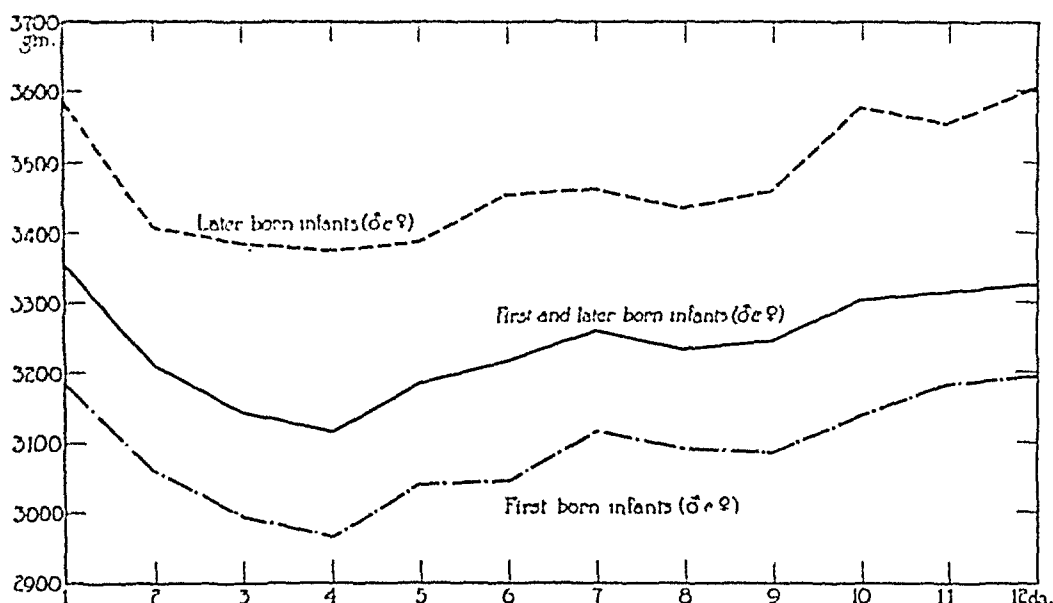


Fig. 5.—Infants' daily weight with mothers on a high protein diet.

They also remark that "Until recent years it was believed that milk varied in percentage of fat from milking to milking according to the daily feed and care the cow received. We now know that if the cow received sufficient nutrients to maintain her body weight, the percentage of fat cannot be materially altered for any long period of time by greater or less liberality of feeding or by supplying any particular kind of feed." "It is not the body of the cow or the digestive tract, but the glands of the udder which determine the characteristics of the milk yielded by each individual cow. This is what we should expect, for if milk varied with every slight change of food and condition, the life of the young, dependent on such milk, would always be in jeopardy."

Jordan, Jenter, and Fuller in their studies on the nutrition of milch cows found that "Over 40 per cent of the available energy value of the rations was used for maintenance, over 30 per cent reappeared in the milk solids, leaving a balance of from one-fifth to one-fourth of the ration. The logical conclusion is that this balance, in part at least, sustains the work of milk secretion."

They were not able to prove that supplying more or less protein or more or less fat caused material changes in the cow's milk. They did not feel justified in con-

cluding from the experience of others or their own that "The composition of the ration determines to a large extent the character and composition of the milk."

Savage writes that "Investigators and practical feeders alike have found that there is a certain relation between the protein and the carbohydrates and fat in the best rations. This relation is called the nutritive ratio. The ratio is always expressed as the amount of carbohydrates and fat that there is in a given feed or ration compared with one pound of protein." "A feed or ration having a nutritive ratio of less than 1:6 is spoken of as having a 'narrow' nutritive ratio; if the ratio is above 1:6, the ration or feed is said to have a 'wide' nutritive ratio."

Hall and Wheeler from their investigations as to the effect of changes in the feed on the yield of milk concluded that "In general, the milk flow increased most or diminished least when the greatest increase was made in the total amount of digestible food supplied, without regard to moderate changes in protein content; and the most rapid shrinkage in milk yield accompanied the greatest reduction in nutrients. This reduction, however, was usually associated with a reduction of protein." "Changes in the amount of protein, within ordinary limits, produced less effect than changes in the total nutrients." They believed that

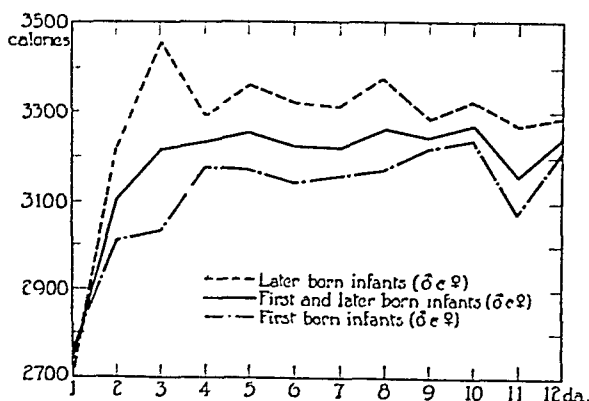


Fig. 6.—Mothers' daily caloric intake when on a high carbohydrate diet.

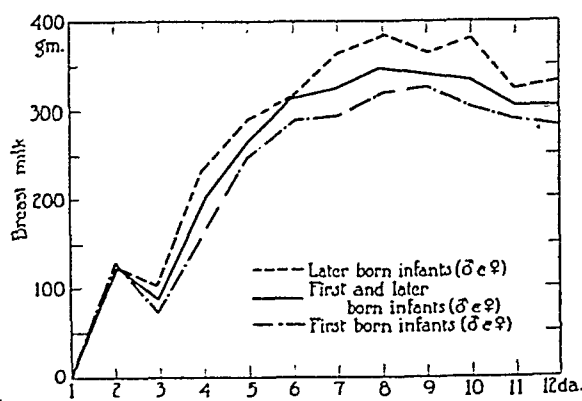


Fig. 7.—Infants' daily breast milk ingestion with mothers on a high carbohydrate diet.

"Changes in the quantity of nutrients has greatly more influence on the milk yield than proportionally large changes in the amount of protein. If the available energy of the ration is sufficient, and is kept at a uniform point, there may be quite a wide range in the nutritive ratio without materially affecting the milk flow."

Hart and Humphrey in a study of the relation of quality of proteins to milk production found that the quality of the proteins was an important factor in the production and maintenance of milk and that the synthetic powers of the mammary gland did not wholly compensate for deficiencies in protein structure. They felt that their work opened anew the problem of the protein requirements for milk production and that it should be studied from the newer angle of protein structure. They found, for example, that milk proteins had an efficiency for milk production and tissue restoration of about 60 per cent, while corn and wheat grain proteins showed an efficiency of 40 per cent and 36 per cent respectively.

In a later investigation they were able to show a decline in the total solids and the total yield of milk after having the cows on a negative nitrogen balance. There was also a marked difference in the utilization of the various concentrates used.

In a later article the same authors pointed out that by maintaining a positive nitrogen balance with a relatively low protein intake, on a ration having approximately a nutritive ratio of 1:8.5, there was a slow shrinkage in milk volume,

but a maintenance of the percentage composition of the milk. They also showed from their work that the utilization and efficiency of various proteins varied according to the way they were used, whether singly or as supplemental to other protein foods. They concluded that "These facts must emphasize in a very striking manner the limitations of any classification of natural foods in respect to the efficiency of their proteins, based on the determination of such nutritive worth in a single food material or a single food mixture."

Kennedy and Dutcher from a study of the influence of the diet of cows upon the amount of vitamins A and B present in their milk decided that the presence of these vitamins in the milk is entirely dependent upon their occurrence in the diet. They further believed that "The effect of the vitamins is not necessarily one of appetite stimulation but rather a stimulation of metabolic processes which promote growth."

Meigs in some very recent work stated that he felt that "The milk secretion is pre-eminently affected through changes in the quality and quantity of the amino-acid mixture circulating in the blood. Such changes are brought about by changes

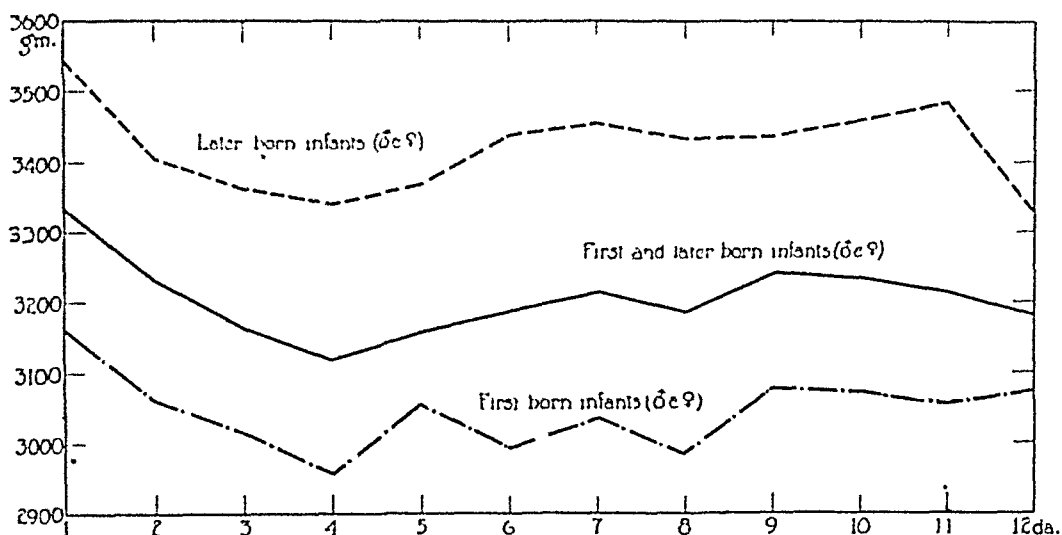


Fig. 8.—Infants' daily weight with mothers on a high carbohydrate diet.

in the quantity or quality of the protein fed, and also by marked changes in the quality of the non-protein portion of the ration. They tend to affect the whole amount of milk yielded rather than the concentration of protein in the milk, though the latter kind of change can easily be detected when the experimental conditions are appropriate. The amino-acid mixture circulating on the blood plasma seems, under certain circumstances, to have an effect on the secretion of milk fat."

"Milk fat is derived from the phosphatid of the blood plasma. Its secretion is probably, to some extent, dependent on the concentration of phosphatid in the blood, and therefore on both the fat and phosphorus supplied in the food." "The results indicate that a shortage of carbohydrate in the food affects the milk yield through changes brought about in the amino-acid mixture of the blood." "The plasma calcium may, therefore, be regarded as the precursor of the milk calcium. The concentration of plasma calcium is extremely constant and largely independent of the food supply. It is not surprising, therefore, to find that changes in the quantity of calcium in the food have no immediate effect on milk secretion."

Insofar as the vitamins are concerned, Meigs felt that the evidence thus far obtained indicates that "changes in the vitamin content of the diet influence



directly the concentration of vitamins in the milk rather than the amount of milk secreted."

Lusk in a recent edition of his work, "The Elements of the Science of Nutrition," stated that "The influence of nutrition on the production of milk has been the object of countless investigations, but unfortunately most of these experiments have been conducted for commercial purposes on cows and goats. These animals, with their fundamental ration consisting of hay, do not allow of the ingestion of simple foods. On the other hand, the milk supply of even a large bitch is very limited in quantity and is with difficulty obtained. The writer is not aware of any scientific observation on the composition of human milk as influenced by food, although such researches would seem of great importance."

The earliest investigation of the effect of diet on milk production and composition which the author of the present paper has been able to find is that of Vernois and Becquerel. They conducted some experiments on women, from which they concluded that the kind of nutriment had little influence upon the com-

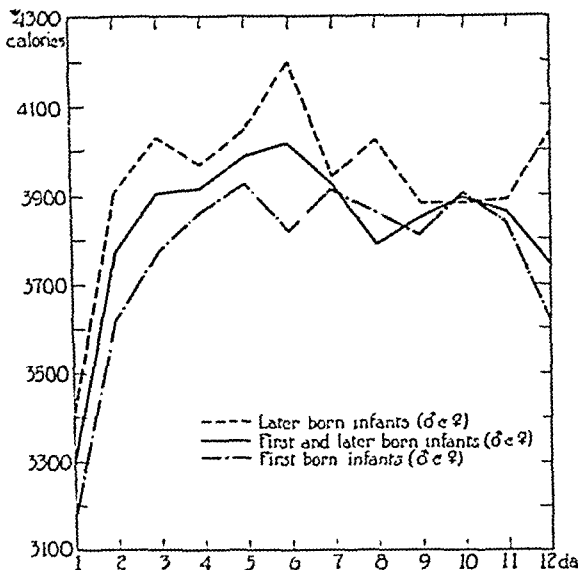


Fig. 9.—Mothers' daily caloric intake when on a high fat diet.

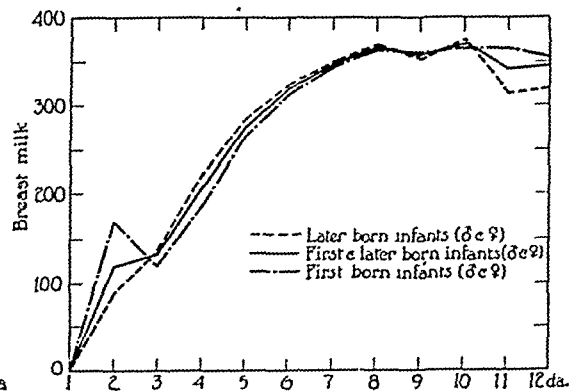


Fig. 10.—Infants' daily breast milk ingestion with mothers on a high fat diet.

position of milk but that the amount of food was much more important. They believed that excessive nutriment increased the output of milk as well as that of casein and fat. They felt that scanty nutriment had an opposite influence.

Pasch from his study of the effect of undernutrition on the fat content of human milk decided that if the mother was in fairly good health moderate undernutrition did not produce a diminution of the butter fat in human milk.

Hoobler in his most important work on the effect of diet on the production of human milk demonstrated some interesting facts. He summarized his results as follows:

1. A nutritive ratio of 1:6 or narrower seems best adapted to the need of nursing mothers.
2. Animal protein is more suitable than vegetable protein in supplying nitrogen for milk and maintenance of nitrogen balance.
3. The protein derived from nuts when fed with other vegetable protein is suitable for supplying milk protein and for maintaining nitrogen equilibrium.
4. A diet composed exclusively of cereals, fruits and vegetables does not supply

sufficient protein for elaborating milk protein and causes a severe drain on the tissues of the mother.

5. Of the various forms of animal protein, that which is derived from cow's milk seems particularly suitable for the production of human milk protein, as well as for the preservation of maternal tissues.

In 1922 I published a joint paper with Dr. C. A. Stewart on "Milk Ingestion in Relation to Changes in Body Weight of Newborn Infants."

There were about 300 cases studied in this work and some basic facts were established in regard to the amount of mother's milk ingested by babies during the first ten days of their lives. The weight loss and increase of these infants day by day was noted. The data established by this study in the Swedish Hospital serve as a basis for the present work, which was done in the same institution.

The present investigation covers over four hundred cases. These cases have been divided into four series according to the diet received by the mother. If we include the older series mentioned above, we are really dealing with five series. In the old series of 298 cases

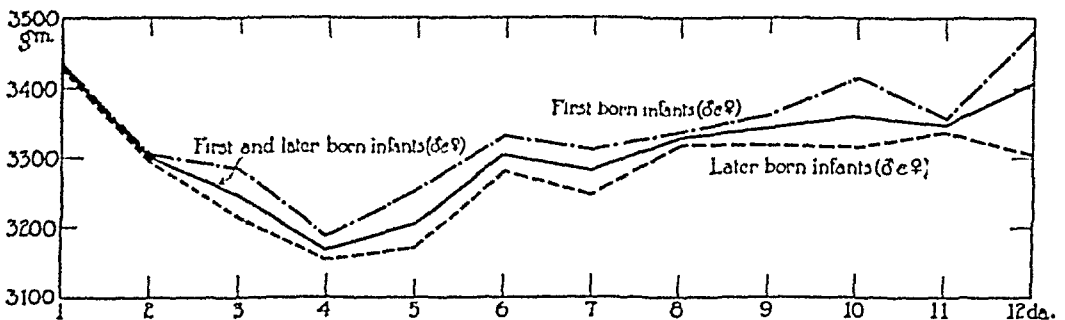


Fig. 11.—Infants' daily weight with mothers on a high fat diet.

the mother was on an ordinary hospital diet, which was not recorded or calculated. The patients were served from the hospital and diet kitchens with no particular regard to more than simple dietary principles. The remaining or present series are four in number and in these the diets were carefully worked out and scrutinized. The exact amount of food taken by the patients with each meal was determined, and also the amount of protein, carbohydrate, and fat was worked out.

The cases have been run in series of approximately one hundred each: (1) High protein diet, (2) high carbohydrate diet, (3) high fat diet, (4) balanced diet. The babies were weighed before and after each nursing to determine the amount of milk taken from the mothers, and if expression was practiced this was added to the amount ingested at each nursing. The net weight of the infant was taken daily.

We have compared the effect of these different diets on the amount of breast milk secured by the babies in the different series, and also the actual weight loss and gain in the babies of the mothers who were

on the different diets. We hoped in this way to secure some valuable information as to the amount of food taken by the different mothers and also the effect of pushing the different food ingredients on lactation.

It seemed to the author that some definite information on this subject would be well worth while, and it seemed possible that some information might be obtained. We hope to be able to show whether or not pushing proteins, carbohydrates, or fats has any appreciable effect on the mammary secretion as shown by the amount secreted or by its effect upon the infant.

In this work there has been no attempt to do any detailed metabolic work upon the mother, and no milk analyses have been done. The

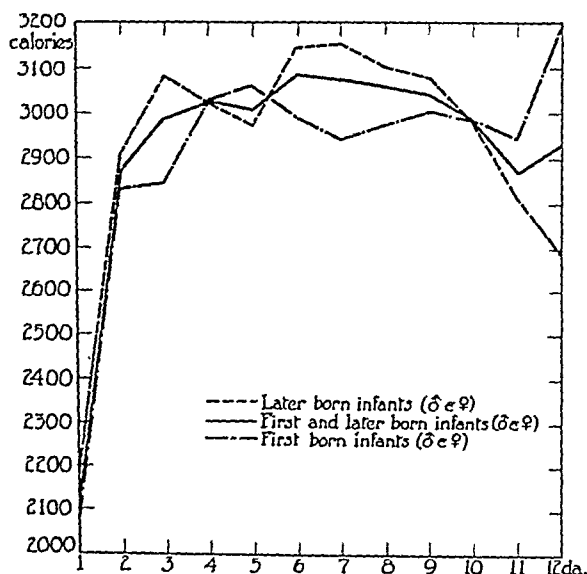


Fig. 12.—Mothers' daily caloric intake when on a balanced diet.

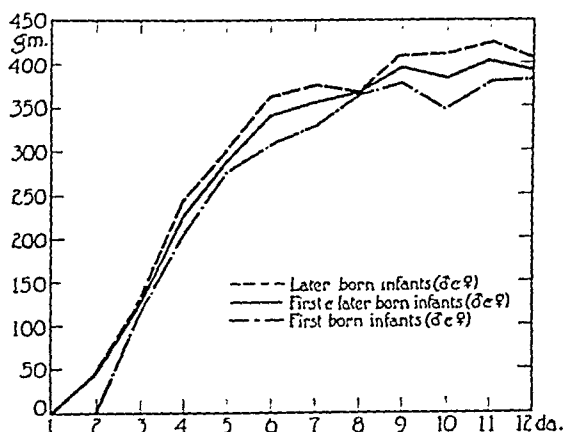


Fig. 13.—Infants' daily breast milk ingestion with mothers on a balanced diet.

study is one based on a rather large number of cases and it is more or less statistical in character. It is not a clinically or metabolically scientific discussion. Accurate but gross methods have been used, and the efficacy of the different diets determined by the results upon the offspring, which is really the crucial test of the value of breast milk from either a quantitative or a qualitative point of view.

There are many factors which influence the amount of milk secreted by the human mother. The most important single factor is probably the individual characteristic of the mammary gland. This is probably best shown by the observation which can be not infrequently made in the nursing mother, that the breast of one side secretes much more than that of the other. The two mammary glands are thus subjected to as nearly identical conditions as it is possible to obtain.

There are many other things which have a great influence on the

amount of milk secreted by a mother, but none of them will stimulate a breast to secrete beyond its individual capacity. Unfavorable conditions tend to keep the secretory activity of the gland below the maximum.

A knowledge of the different things which affect the secretion of milk detrimentally will help us to surround the nursing mother with the optimum conditions and thus secure the most and best milk for the offspring.

It oftentimes becomes a matter of the very greatest importance to obtain from a human mother the maximum milk production. It would many times be desirable to influence the percentage composition of milk. There is very little experimental or other evidence to indicate that we can in any material way influence the quality of a

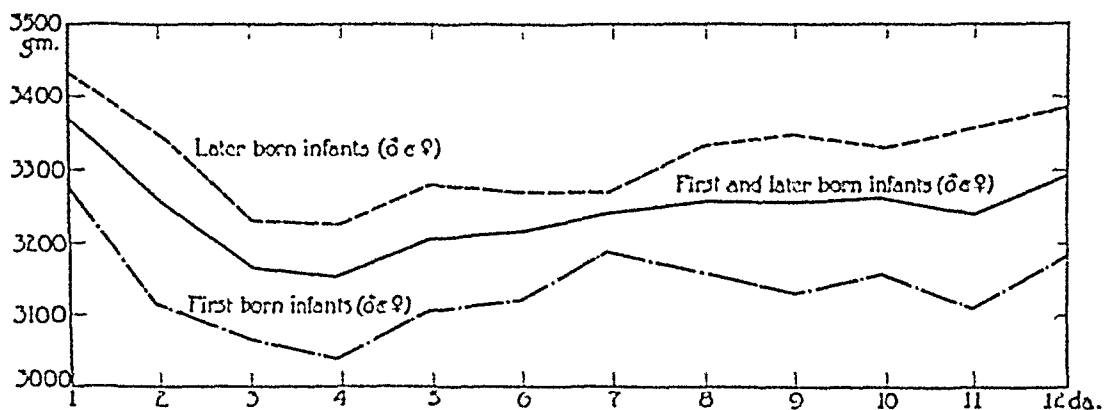


Fig. 11.—Infants' daily weight with mothers on a balanced diet.

mother's milk. On the other hand, there seems to be good reason to think that certain factors tend to depress and others to stimulate the breasts to their maximum production.

We could enumerate some of the conditions which seem to affect the activity of the breasts. The age and parity of the mother have their influence. The physical characteristics and condition have much to do with proper functioning of the milk glands. The same statement is true regarding the psychic characteristics and condition, which would doubtless be particularly true of the human mother. The environment, including hygiene and diet, is without doubt very important. The size and demands of the offspring, together with the manner in which the infant nurses, are of very definite importance in the production of milk. Other conditions surrounding the act of nursing itself depress or promote milk secretion, such, for instance, as pain from sore nipples, or contrariwise, the satisfaction and pleasure which may be associated with a normal act of nursing.

In the present paper we have tried to neutralize these various influences by having relatively large series of mothers under as nearly

the same conditions as possible but varying certain constituents in the diet in rather large groups of mothers. All of the observations were made in the same institution, the Swedish Hospital, Minneapolis, under the supervision of the same personnel. Some of the other factors have been analyzed in the accompanying tables and it can be readily seen how closely they coincide.

The age factor in relation to the parity of the mother and the sex of the offspring for the four diets has been tabulated. The average

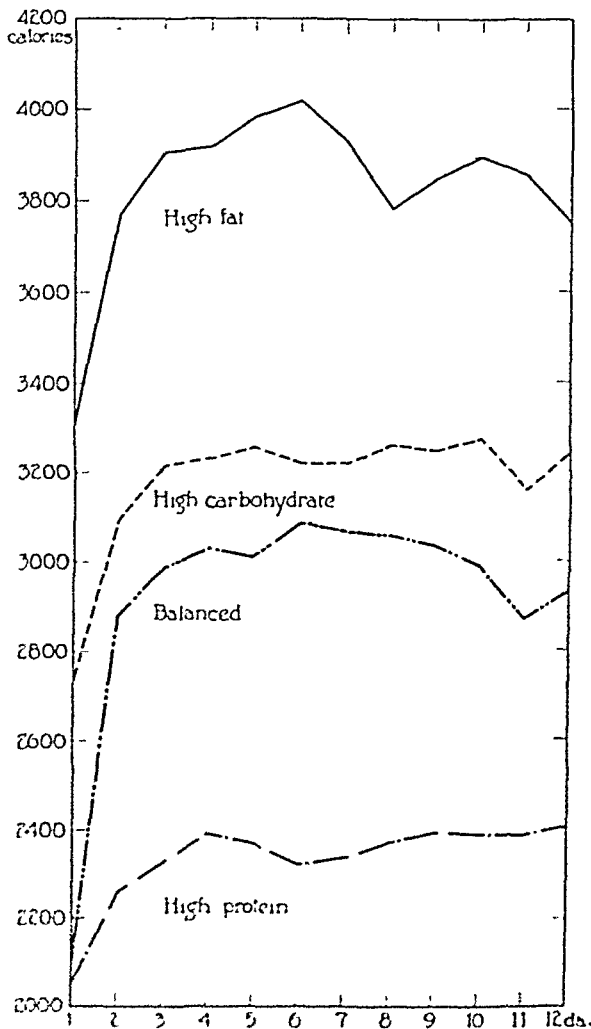


Fig. 15.—Mothers' daily caloric intake for different diets.

ages of the mothers in the primiparous group show very little variation in relation to either the different diets or the sex of the offspring. The maximum and minimum ages also show remarkably little difference in the various groups.

The average ages of the mothers in the multiparous group are naturally somewhat higher than those in the previous group, but run nearly the same for the different dietary and infant sex groups.

It would seem from the data in this table that the age factor in

relation to milk production could be eliminated, inasmuch as the average ages and also the maximum and minimum ages are so similar in the different groups.

The weight of the mothers in the different groups was averaged. The average weights are so nearly alike that it would not seem that there could be much difference in average maintenance requirements of the patients included in the various dietary groups.

It is very interesting to note that with the exception of the first day there was a remarkable uniformity in the caloric intake on the different days. This seems to hold true for all of the diets. Even though the amount taken on the different diets varied greatly, there was a noticeable uniformity in the daily caloric intake on the same diet. It is also noteworthy that in general the average daily caloric intake was somewhat greater among the multiparous than among the

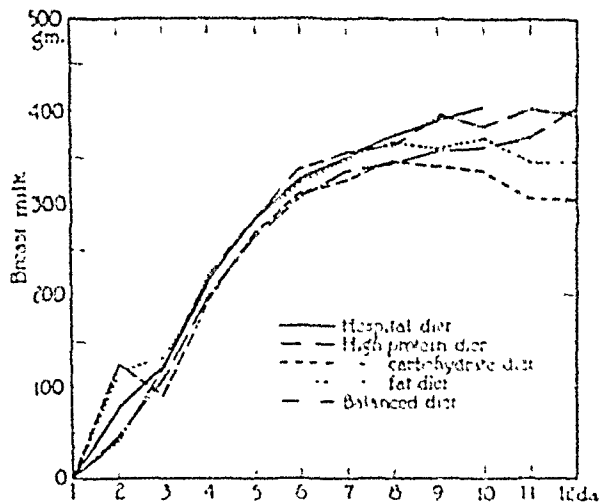


Fig. 16.—Infants' daily milk ingestion with mothers on different diets.

primiparous women. There seemed to be no relationship between the amount of food ingested by the mother and the sex of the infant.

There was a most striking difference in the food ingestion of the mothers in the different dietary groups. The mothers who took a high protein (H.P.) diet had the least caloric intake of any of the mothers. This applies not only to the average for the whole group, but also to the subgroups. The average daily ingestion ran from about 2000 to 2400 calories.

The next larger amount of intake was in the balanced ration (Bal.). The statements made above apply to this diet also, with the exception that the average number of calories taken each day varied from approximately 2100 to 3100. The high carbohydrate (H.C.) diet comes next in line, with the same general statements applying. The average daily caloric food intake ran from about 2700 to 3300. The high fat (H.F.) was greatly in excess of the others in the food value con-

sumed. The average daily amount eaten varied from 3300 to 4000 calories.

It is important to remember that these women were at rest most of the time and were not undergoing any great physical strain, which would, of course, minimize their caloric requirements.

Assuming that the calories necessary for a lactating woman at rest would approximate the needs of an individual at work, one could reasonably believe that about 2400 calories a day would constitute a fairly normal food intake. This should be somewhere nearly correct for women averaging around 132 lbs. or 60 kilos. This food value seems to be more closely attained in the high or liberal protein diet than in the others.

On the high protein diet, a liberal amount of protein was consumed by all of these women, but it is rather striking that the multiparae took more protein than the primiparae, while the other ingredients averaged about the same for all the different subgroups.

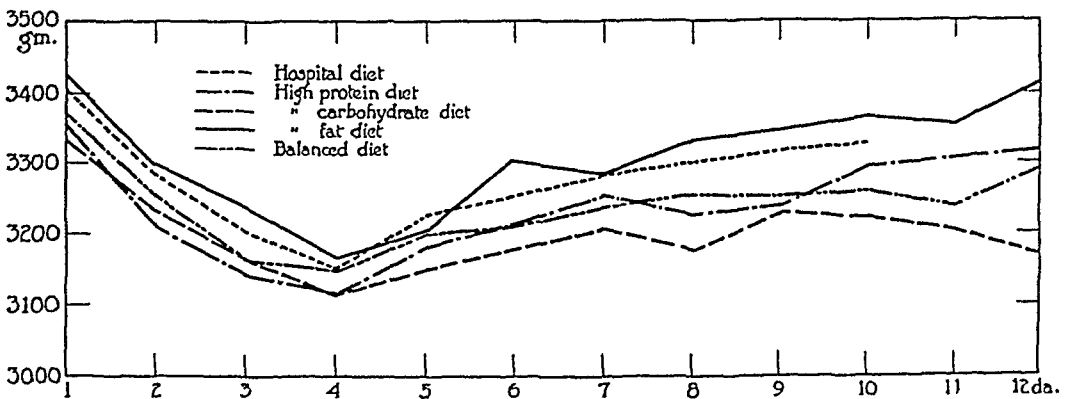


Fig. 17.—Infants' daily weight with mothers on different diets.

In the other three regimes the amount of protein consumed was considerably less than that taken on the high protein diet but the caloric intake was considerably more. In the case of the high carbohydrate and high fat diets, it must have exceeded the actual requirements for maintenance and milk production.

Both the high fat and the high carbohydrate diets, especially the latter, seemed to appeal to the patients more than either the balanced or high protein rations. It is difficult to know whether they took an excess of food because it was palatable or in order to secure enough protein to meet their minimum needs. They secured about 80 gm. or 320 calories from their protein intake on these diets as compared with about 107 gm. or 427 calories on the high protein feeding. The average range of caloric intake on the different diets was over 1500 calories from the minimum (H.P.) to the maximum (H.C.). The following ratio might be expressed: H.P. : Bal. : H.C. : H.F. as 23 : 30 : 32 : 39 in reference to the total caloric intake. The amount of

protein taken on these respective diets might be expressed as follows: 42 : 31 : 31 : 33. In the same manner the average caloric value of the fat ingested might be expressed numerically, 85 : 104 : 207 : 132. In reference to the average carbohydrate intake, we might use the following mathematical expression: 107 : 141 : 189 : 152.

While these expressions are not absolutely correct, they enable one to visualize somewhat better the relationships of the various diets.

Observations made relative to the effect of the different diets on the infant as shown by its milk ingestion, weight loss and gain, show that the minimum average weight of the infants occurred on the same day of postnatal life, which was the fourth day. The average birth weight for the different dietary groups was very nearly the same, showing only slight variations.

The initial weight loss was not so very different for the infants of the different groups, being the least among those whose mothers were on a high carbohydrate diet, and greatest for the newborns whose mothers had a high fat diet. The weight losses were as follows for the different groups: H.C. 213 gm., Bal. 225 gm., H.P. 238 gm., H.D. (hospital diet) 255 gm., H.F. 264 gm. In none of the groups did the infants regain the average birth weight within twelve days. It was most nearly regained in the H.F. group, and the poorest gain was shown in the high carbohydrate series. The number of grams short of the birth weight were as follows: H.F. 24 gm., H.P. 32 gm., H.D. (10 days) 75 gm., Bal. 85 gm., H.C. 157 gm.

In so far as the milk ingestion was concerned the H.C. and the H.F. showed the greatest amounts on the second day. Two of the series showed a progressive increase in the amount of milk secreted, namely, the H.P., in which a maximum of 402 gm. was attained on the twelfth day, and the H.D., with 405 gm. on the tenth day. In the other series the maximum was reached earlier and then showed a tendency to decline. The largest amount was reached in the H.C. diet on the eighth day (348 gm.). This gradually fell to 304 gm. on the twelfth day. Those having the H.F. diet secreted an average of 372 gm. on the tenth day and 345 gm. on the twelfth day. The Bal. diet gave 401 gm. on the eleventh day and 391 gm. on the twelfth day.

It is difficult, if not impossible, to draw absolute conclusions regarding the quantitative effect of diet upon the mammary secretion. It is quite obvious that the nursing mothers ate more than necessary of both the high carbohydrate and high fat diets. This was especially true of the latter.

This excess diet had no apparent effect on stimulating milk production. A high caloric feeding might be objectionable in view of the not infrequent observation that rapid increase of weight in nurs-



ing mothers is not uncommonly associated with a decreasing milk supply.

The milk ingestion and weight increase of the infants in the neonatal period would seem to indicate that the milk secretion increases more steadily on the rations which contain a liberal amount of protein. These diets were also mixed and did not run to an excess of any of the ingredients.

The hospital, high protein, and balanced diets seemed to meet the needs of the mother and infant, without excessive caloric intake, better than either the high fat or high carbohydrate diet.

This is not in accord with common practice in relation to the pushing of certain types of feeding in nursing mothers. Certain later observations of a clinical and empirical nature on some of these mothers led both Dr. C. A. Stewart and the author to feel that liberal protein feeding is of definite value in securing the maximum milk supply from these nursing mothers.

This work was done in the Swedish Hospital of Minneapolis and the author is deeply indebted to many of the members of the hospital staff and especially to the dietitians, Miss Juanita Kelley and Miss Irene Dahl.

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LA SALLE BUILDING.

## BLOOD-STREAM INFECTION TREATED WITH MERCURO- CHROME 220 INTRAVENOUSLY\*

BY EDMUND B. PIPER, M.D., PHILADELPHIA, PA.

TWO years ago before this Society, I presented a report of animal experimentation and clinical work on the chemical disinfection of the blood.† Having accepted the responsibility of injecting mereurochrome intravenously for therapeutic purposes, following properly controlled laboratory and animal experimentation, I am now presenting data to show that the originally described principles and practice have been followed essentially unchanged. I wish to present the limitations of the above and to report certain failures and successes. Minor details of variation in administration and dosage will be noted.

The conclusions of my original paper were as follows:

1. There are certain cases of puerperal septicemia so fulminating and virulent that no treatment can possibly save them.

2. The use of antistreptococcal serum has appeared to be of great value in some cases. Frequently repeated small blood transfusions are of value, as apparently are other methods of intravenous medication.

3. A solution of mereurochrome given intravenously in the proper dosage appears, in some cases, to be of great value and to have no deleterious effects.

4. All cases of puerperal septicemia are so serious and so frequently fatal that heroic methods are justified.

The question arises as to whether or not, following a much larger clinical experience, the conclusions arrived at two years ago are justified at the present time. As far as the use of mereurochrome intravenously in blood-stream infections is concerned, I would say that my increased clinical experience makes it impossible for me to subscribe to the last part of the original conclusion, Number 3., i. e., that a solution of mereurochrome has no deleterious effects. Since that time I have seen two cases and one other has been reported to me in which ill effects have been noted. Whether these should be attributed to the drug or to the severity of the infection it was impossible to determine. However, if these effects were not reported we feel that we would not be doing our full duty.

Regarding the change in the dosage,—in the original paper we recommended 25 c.c. of a 1 per cent solution of mereurochrome in distilled water for every 125 pounds of body weight. This we believed to be

\*Read at the Forty-ninth Annual Meeting of the American Gynecological Society, 1924.

†The Treatment of Puerperal Sepsis by the Use of Mereurochrome Intravenously with a Report of Animal Experimentation in the Chemical Disinfection of the Blood," AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, iv, No. 5, November, 1922.

safe at the time, and still do so, but in order to procure higher germicidal activity within the blood stream the dosage was increased to 30 c.c. for every 100 pounds of body weight. It was during this period of increase that one of the ill results occurred.

We have now arrived at a somewhat different method of administration.<sup>2</sup> In cases that are not *in extremis* but with positive blood cultures we proceed in the following manner. An initial dose of from 20 to 30 c.c. of a 1 per cent solution is given depending upon the weight of the patient. This dose is not intended to be in any way curative but is given primarily to observe the action on the kidneys. If, following this first dose, there is no apparent decrease in the excretory functions of the kidneys, nor increase in the evidence of acute nephritis, we proceed to use what we now consider the maximum dose. This is estimated as 30 c.c. for the first 100 pounds of body weight and 5 c.c. additional for each 30 pounds above the first 100 with a maximum dose of 45 c.c. for anyone beyond the 200 pound mark. Naturally this matter is somewhat one of guesswork as all these patients are much too ill to get their exact weight. Furthermore it is merely a working rule and I should have no hesitancy in exceeding this dosage under certain conditions.

In a recent number of the *Journal of the American Medical Association*, two cases of ptyalism are reported following the intravenous use of mereurochrome. I would call attention to the fact that the danger of this condition was mentioned in my original paper. It was suggested to me recently by one discussing this method of treatment that all the reaction that occurred was due to mercury poisoning. We had always surmised this to be the case, at least to a great degree, but we felt there was a basis for our hypothesis that some of the chill and rise in temperature might be due to the destruction of microorganisms within the blood stream. This has been borne out in a considerable number of cases. We observed that there was very slight reaction in those cases in which we suspected blood-stream infection, but which subsequently showed no microorganisms in the blood cultures taken at the time of the injection. Our results have varied with the different types of microorganisms shown to be present. They have been good for the staphylococcus and for the streptococcus hemolyticus and nonhemolyticus. The drug in my hands has been utterly useless in the streptococcus viridans. Experimentally it has been of slight value in the pneumococcus.

As stated in my original report on the subject, mereurochrome originated in the clinic of Dr. Young of Baltimore and was there used exclusively in the genitourinary tract and for other local infections. Following my presentation of the experimental and clinical work of this drug, at the request of Dr. Young in May, 1922, I read to him and his

<sup>2</sup>"Treatment of Puerperal Septicemia," Edmund B. Piper. *Surgical Clinics of North America*, February, 1924.

staff in Baltimore the original article presented before this Society the week before. Since that time Dr. Young, having adopted this method of treatment, has reported before various societies and in numerous publications his subsequent results, which have been most encouraging. A most interesting fact in Dr. Young's report is that he has been able to treat successfully certain local conditions such as pyelitis and perinephritic abscess through the intravenous use of mercurochrome. It may be remembered that in my original paper one case of pyelitis was reported as symptomatically cured. We did this to see what merit there might be in intravenous use for local conditions and since then have had some successes but more failures.

Dr. B. C. Hirst is reporting 17 cases in which the drug has been used intravenously in streptococcal infections in the puerperium. The recoveries in this series will approximate 45 per cent. This includes the moribund and unconscious. Dr. Alfred Stengel, Professor of Medicine at the University of Pennsylvania, is reporting five cases, two of which were staphylococcal blood-stream infections.\*

As this report is in no wise a statistical one I feel at liberty to append herewith a few cases which have been of unusual interest. These will include not only successful but decidedly unsuccessful ones.

CASE 1.—Dr. Carl V. Vischer†, of Philadelphia, on August 21, 1923, was infected by a needle prick while operating in the Hahnemann Hospital. August 27, infection incised, very little, if any, pus found. August 30, admitted to the Hahnemann Hospital. Culture from wound showed the staphylococcus aureus; finger was further drained. Temperature, 105° F. I saw the patient at this time and ordered 30 c.c. of a 1 per cent solution of mercurochrome intravenously.

Apparently very little of this got into the vein as all of the tissues in the vicinity were discolored by the dye. Temperature, 106° F., very slight reaction. September 5, 25 c.c. of mercurochrome intravenously. Chill in one hour. Temperature 104° F., pulse 140. September 6, reaction was subsiding. September 8, blood culture was negative for 24 hours, one or two colonies at end of 48 hours. September 9, arm incised at the point of the original injection of mercurochrome and considerable pus found. September 14, 30 c.c. of mercurochrome intravenously. Good reaction. Temperature 105° F. September 21, blood culture sterile. From this point patient acquired various local infections, one being a prostatic abscess. He was discharged December 12 in fair condition. I have talked to him within the past week and find he has been at work for some months but still has some trouble at the original focus of infection and with his prostate. He appears to be well on the road to complete recovery.

CASE 2.—Mrs. X. Patient living in near-by town was seen by Dr. Nicholson in consultation, who the following day asked me to see her with him. She had been delivered in a hospital where there had been some previous cases of sepsis. Her blood stream showed the hemolytic streptococcus and she was apparently fatally ill. Her abdomen was somewhat distended, she was very drowsy and her respirations moderately rapid. As she presented the characteristics of a fatally ill patient I gave her 45 c.c. of a 1 per cent solution intravenously. There was a

\*The reports of Doctors Hirst and Stengel are not yet published but will be in the near future.

†Dr. Vischer has given me permission to use his name in this case.

marked reaction and the following day she seemed much improved. However, she developed anuria and died about 48 hours after the injection. It is my belief that nothing would have saved her, but our present method of administration, namely, smaller dosage for the first dose, would, at least, have removed the stigma of an apparent mercurial poisoning.

CASE 3\*.—Man about forty years old, admitted to the University Hospital in the Medical Service. He was comatose and had all the symptoms of meningitis. Some days previous to his admission a lumbar puncture was done in some other hospital which was the apparent cause of the condition. A lumbar puncture done on admission showed the cerebrospinal fluid to be loaded with staphylococci; in fact the material was almost pure pus. An attempt was made to wash out the cerebrospinal canal through the cisterna magna with mercurochrome. This was found impossible, however, owing to the thickness of the pus. Considering the case to be utterly hopeless, 30 c.c. of a 1 per cent solution of mercurochrome were injected into his veins. A lumbar puncture done 24 hours later drained off a much thinner fluid stained by the dye of the injection. He regained consciousness within 48 hours and went on to a permanent recovery.

CASE 4.—Undergraduate student of the University of Pennsylvania admitted to the student's ward with a staphylococcus blood-stream infection due to a primary infection in his thigh. After two doses of mercurochrome his blood stream was found to be sterile. He had a long, tedious convalescence, was treated surgically and eventually recovered.

CASE 5†.—Patient, Mrs. T. Y. admitted to the University Hospital, September 20, 1922. Three weeks previous to admission was delivered of a normal child without difficulty. Two days after delivery she had severe pains in both iliac regions. These subsided and recurred with greater severity. On admission to hospital a blood culture was taken September 21 which showed nonhemolytic streptococcus. September 25 she received 27 c.c. of a 1 per cent solution of mercurochrome. She had a well marked reaction of the usual type. As this case appeared to be in a desperate condition, although her kidneys were functioning well, an innovation in treatment was decided upon. Twenty-four hours after the initial dose she received an injection of 15 c.c. which was followed by a slight reaction. A blood culture taken October 5 was sterile. At this time localization formed in Douglas' culdesac. This was opened and drained from below and the patient made an uneventful recovery. The idea in this particular case was that, estimating the maximum dose to be excreted in 48 hours, we hoped to prolong the activity of the drug by repeating one half the dose in twenty-four hours.

The marked success of this method would warrant its consideration, but I am convinced that it is more dangerous, unless in experienced hands. I could report other cases of success and failure; one, in which anuria occurred in a moribund case, others in which the blood stream was sterilized according to the laboratory reports, but the patients died. But as I am limited as to time and as there will be other papers in which more detailed reports will appear, I wish to confine myself more to a general discussion of this method of treatment.

Dr. Herbert Fox, director of the William Pepper Laboratory of the University of Pennsylvania, has authorized me to quote him as saying

\*This case is being reported by Dr. Stengel in greater detail.

†This case is included in Dr. Hilt's forthcoming report.

that before the intravenous use of mercurochrome was instituted, he personally had never seen a case of staphylococcic septicemia recover. In the two cases just quoted above and in two cases that Dr. Stengel will report, we have a total of four cures in staphylococcic septicemia. Dr. Young has reported others, although he himself thinks that gentian-violet used intravenously is of greater value in this type of infection. It must be borne in mind that when these cases recover there is not a miraculous and sudden return to life from a moribund state. Success depends upon repetition of dosage and accurate observation of fluid intake and urinary output. The state of the kidneys is always the determining factor upon whether or not the drug should be repeated. The decision as to when a second or third dose should be given, is dependent upon the cessation of diarrhea and disappearance of urinary discoloration.

In closing I wish emphatically to state:

1. At no time have we considered this method of treatment to be infallible.

2. If the drug is to be used successfully, early diagnosis through blood culture must be made.

3. We are satisfied that lives have been saved by this method that would have been lost by the ordinary accepted medical and surgical treatment of septicemia.

4. We do not believe that this method of treatment is by any means the last word in these conditions, but we do believe that it is a step in the right direction and we hope that some investigator will be able in the near future to find the ultimate cure.

5. We cannot too strongly impress upon the profession that in spite of reports of brilliant recoveries, this is undoubtedly a dangerous procedure and is only warranted by the severity of the condition with which we are confronted. Its promiscuous use is to be discouraged as this will unquestionably bring whatever merit the treatment may possess into definite disrepute.

## UNRUPTURED INTERSTITIAL PREGNANCY, WITH ANATOMIC AND HISTOLOGIC REPORT OF AN EARLY CASE\*

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ALTHOUGH the interstitial variety is the rarest form of ectopic gestation, many references have accumulated, but the histology and finer anatomy have been given much less attention than the gross anatomy and clinical features. Only Leopold,<sup>1</sup> Ulesko-Stroganowa,<sup>2</sup> Rashke,<sup>3</sup> and Erna Glaesmer<sup>4</sup> have adequately studied these finer phases of the condition. Therefore, when this unusual specimen was acquired, we decided to study it by means of serial sections made of the entire specimen, as was done in our previous work, "Microscopical Studies of Tubal Pregnancy."<sup>5</sup> The large sections of the whole organ give opportunity, not only for comparative histologic study not afforded by the usual "block" sections, but all anatomic relations are preserved, thus permitting the complete following out with the microscope, of some of the more minute anatomic structures, which is difficult or impossible by dissection.

This study is based upon gross appearance and microscopic findings in 427 serial sections made of the body of the uterus containing an interstitial pregnancy.

For the specimen we are indebted to Dr. Frederic Souba of the Department of Obstetrics and Gynecology, University of Minnesota, who removed the body of the uterus after making the diagnosis of interstitial pregnancy. The patient was forty-two years old, the mother of two children and her menstruation was always regular. She sought advice on account of skipping her menstruation twelve days. She had "spotting" but no bleeding and there was no pain. Dr. Souba reported that she was very slender and easy to examine—"almost like one were holding the uterus in his hands."

Some of the types described by the older authors were based on unsound conclusions and are unfortunately perpetuated in textbooks and the literature.

The type described as being entirely surrounded by the interstitial tube is a myth and the so-called "tubouterine pregnancy" is probably quite as fanciful; even Carus,<sup>6</sup> who recognized it in his classification, admitted it had not been definitely proved. In this type the implantation is supposed to be so near the uterine ostium that the pregnancy

\*Read at the Forty-ninth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 17, 1921.

eventually becomes intrauterine, but no well authenticated case has been described.

All the "tubouterine pregnancies" reviewed by Henning<sup>7</sup> in 1889 were later declared apocryphal by Werth,<sup>8</sup> who also discredits the well-known case of Eiermann.<sup>9</sup> We have critically analyzed the case reported by Scott in 1911<sup>10</sup> and, to say the least, believe it is doubtful. Scott's description of the tumor found in one horn of the uterus does not conform to the universally recognized facts established at operation and postmortem. With the exception of these very doubtful cases this type of interstitial pregnancy has never been seen, so the only justification for assuming that it may occur is the purely theoretical possibility. Even the few instances, sometimes cited as evidence, like the cases of Braxton-Hicks<sup>11</sup> and Mashka,<sup>12</sup> in which the fetus was aborted and the placenta afterwards found in the uterine wall, were not "tubouterine," but interstitial pregnancies in which the fetus was aborted by the rupture of a septum between the pregnancy and the uterine cavity. Inasmuch as there are no accredited cases of "tubouterine pregnancy" it is high time that this mythical type be dropped from our textbooks or at least relegated to the realm of unproved theories.

The so-called "uterotubal" type occurring near the distal portion of the interstitial tube bordering the isthmus also seems possible but Werth<sup>8</sup> declared that he found anatomic foundation only for the true interstitial type.

The confusing older classifications should be displaced by the following simple but quite adequate one of Erna Glaesmer:<sup>8</sup>

Type I, The ovum develops in the fundus musculature of the uterus.

Type II, The development occurs in the side wall of the uterus.

Type III, The development occurs toward the isthmus tubae.

Our specimen, under this classification, belongs to Type I, and may be described as follows:

#### GROSS ANATOMY

The specimen consists of the body of the uterus containing an interstitial pregnancy in the fundus and left cornu. It is an illustration of the usual behavior of an early Type I, interstitial pregnancy in which there is on one horn of the uterus a hemispherical elevation attached by a broad base and pointing upward, outward (Fig. 1) and backward (Fig. 2). This direction of growth is accounted for by the normal course of the interstitial tube which is not directly outward from the uterine cavity to the free fallopian tube but according to Henle<sup>13</sup> and Farre<sup>14</sup> "describes an arc slightly convex upward at the same time approaching the posterior surface of the fundus." Inasmuch as implantation usually takes place at the "angle" of this eccentric course of the tube it must be an etiologic factor.

In our case the implantation occurred at the "angle" where the tube is nearest the posterior surface of the fundus. Quite naturally, growth takes place in the direction of least resistance (Figs. 1 and 2).



The thicker portion of the hypertrophied uterine wall offers considerable resistance while the thinner part stretches to a marked degree of thinness under the influence of the growing ovum or, as in our case, from the pressure of marked hemorrhage. The round ligament is seen arising mesially to the tumor, a valuable differential diagnostic point between interstitial and rudimentary horn pregnancy in which the round ligament is lateral to the tumor.

Another diagnostic point is the broad base of the tumor as seen in Fig. 1. The upward inclination of the fundus toward the tumor is also quite characteristic and was erroneously thought by Ruge and Simon to be pathognomonic of interstitial pregnancy as distinguished from a myoma or rudimentary horn pregnancy (Fig. 1).

The free portion of the fallopian tube comes off from the tumor of the interstitial



Fig. 1.—Interstitial pregnancy, Type I, probably less than three weeks old. Note height of fallopian tube on tumor, mesial origin of round ligament, inclination of fundus toward tumor, broad base and upward and outward growth of tumor.

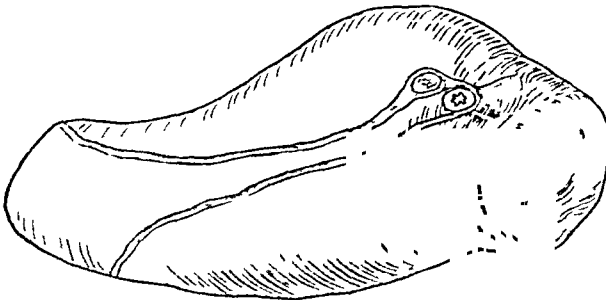


Fig. 2—Illustrating backward as well as upward and outward growth of interstitial pregnancy tumor

pregnancy a little below its summit, (Fig. 1) forced to this elevation possibly by the growth of the ovum, but principally by the mass of hemorrhage within the ovum capsule. By comparison with the opposite side it will be seen how far the tube has been forced upward (Figs. 1 and 3) which could not occur without great stretching or rupture of the tube. With the microscope we found that the tube was torn asunder.

*The Uterine Muscle.*—The uterine musculature participates in the growth process induced by pregnancy earlier and to a greater degree than in any other form of ectopic gestation. Ruge, Werth, Banal and Webster assert that the increase in thickness of the wall of the uterus is more pronounced on the pregnant side, particularly just below the ovum bed. In our case the uterine wall on the pregnant

side ranged in thickness from 1.99 cm. to 2.5 cm. and on the nonpregnant side from 1.2 cm. to 2 cm. (Figs. 3 and 4). The average thickness of the muscular wall on the pregnant side was 2.22 cm. (Fig. 5) and on the nonpregnant side 1.55 cm.

#### MINUTE ANATOMY AND HISTOLOGY

*The Interstitial Tubes.*—The proximal portion of the intramural tube on the pregnant side occupies relatively the same position in the uterine wall as does the opposite tube (Fig. 3). The diameter of the normal canal, according to Waldeyer<sup>15</sup> is one mm. at the uterine end and Werth says it varies from one to one and a half mm. throughout its whole length. Our nonpregnant interstitial tube (Fig. 5) measured 1.5 mm. at the uterine ostium, one-half mm. at the "angle" and it gradually increased in size as it approached the isthmus tubae. Its measure was

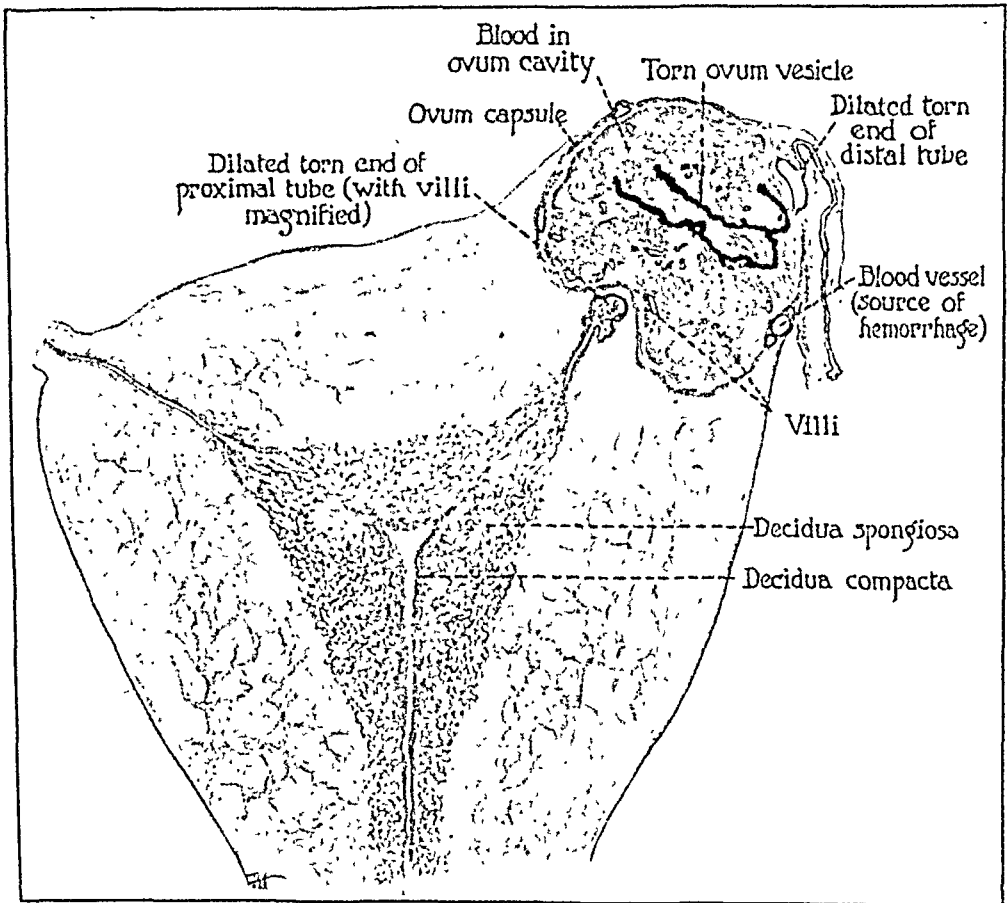


Fig. 3.—Composite drawing of various serial sections brought to one plane. All parts natural size except villi in dilated, proximal portion of tube, which are magnified.

the same at the uterine ostium as the opposite tube (1.5 mm., Fig. 6) and remained the same until it reached a point just below the ovum capsule, where it suddenly became much larger, 3 mm., dilated undoubtedly by the growing ovum before the rupture, for we found several villi in this dilated portion (Figs. 3 and 6).

Immediately above this point the tube suddenly disappears, but after a prolonged search through many slides we observed the torn end of the tube. The normal tube ending in the dilated torn portion had the appearance of a tiny funnel (Figs. 3 and 6). To locate the other torn end was a much greater task, in which we did not succeed until we began at the isthmie portion and traced it with the microscope toward the ovum capsule. At this junction we were rewarded by finding a similar,

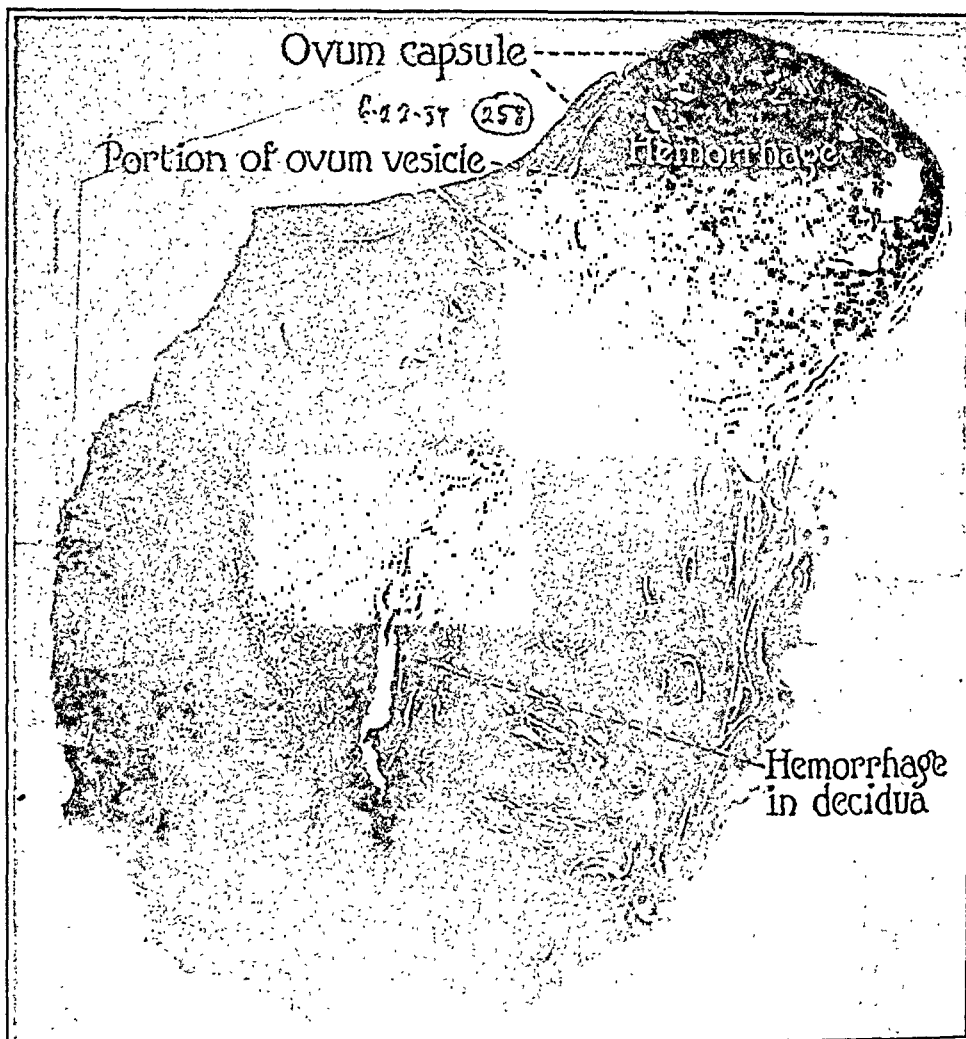


Fig. 4.—Photograph of one of the serial sections, natural size. Note marked hemorrhage in ovum cavity, split uterine muscle constituting ovum capsule very thin at the summit of the tumor; also true decidua with hemorrhage in it and greater hypertrophy of uterine wall on pregnant side.

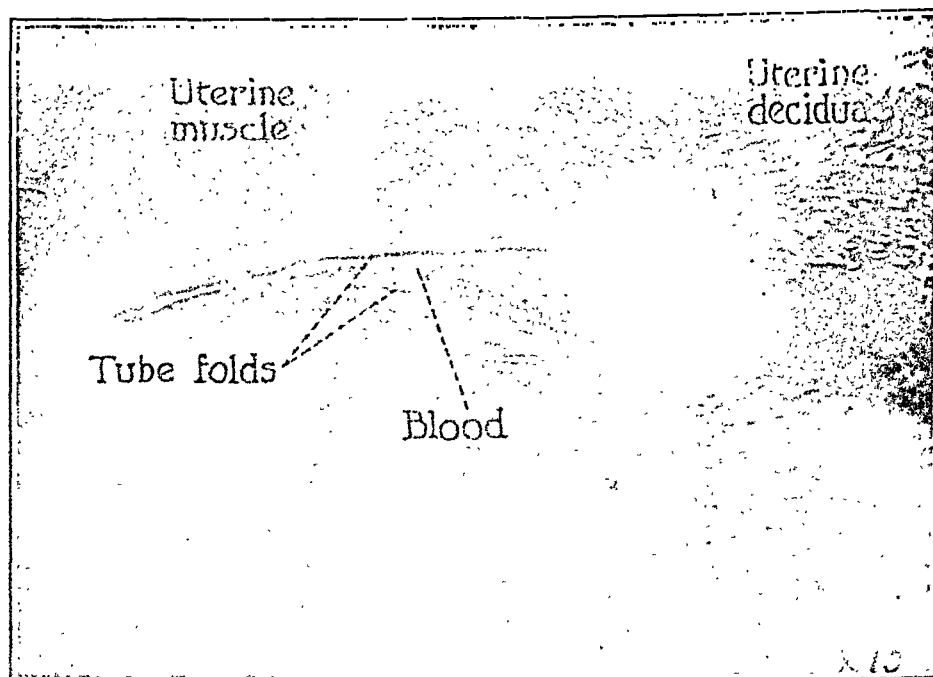


Fig. 5.—Microphotograph of portion of nonpregnant intramural tube marked two times.

though larger, funnel-shaped termination at a point corresponding to the origin of the free tube near the summit of the tumor. This proved to be the other torn dilated end of the interstitial tube (Figs. 3 and 7). This dilated portion was somewhat flattened, measuring 3 by 4 mm. Immediately after entering the musculature of the ovum capsule the tube suddenly decreased in diameter to 0.15 mm. (Fig. 7), (microscopic measurement), gradually increasing as it approached the isthmus portion, where it measured 0.95 mm. The extremely narrow lumen within the ovum capsule is undoubtedly due to the very great stretching of the muscle by the distention.

In the small number of cases hitherto investigated tubal canal remnants of varying lengths have been observed in the ovum capsule wall, but so far as we have been able to find in the literature the interstitial tube has not been traced, in so early a case, completely from the uterine cavity to the free fallopian tube, probably because the investigators have not had the opportunity of studying the entire body of the uterus with the contained pregnancy in serial sections.

In Sidney Harvey's case<sup>13</sup> "several groups of mucous glands (!) were found in the muscular wall." These were, probably, sections of the tube. Rashke<sup>3</sup> also found in the lateral muscular wall of the ovum capsule well preserved tubal mucous membrane and Leopold<sup>1</sup> found cavities lined with cuboidal epithelium.

We found similar cavities lined with undoubted tubal epithelium which prompted us to follow them out in serial sections and discovered that they were portions of the tortuous, interstitial tube distal to the pregnancy and which we were able to reconstruct from the isthmus tubae to the ovum capsule as seen in Figs. 3 and 7.

Ulesko-Stroganowa<sup>2</sup> in his three weeks' old case found no communication between the interstitial tube and the ovum capsule, while in our specimen, approximately the same age, we found both the proximal and distal portions of the tube entering directly into the ovum cavity (Figs. 3, 6 and 7). Werth<sup>8</sup> says "While the part of the tube leading to the ovum capsule from without could be followed in the more exactly investigated cases either to the ovum bed or to the ovum periphery the investigators succeeded more rarely in finding the remnant of the tube leading from the uterus to the ovum." Doran<sup>16</sup> and Muret<sup>17</sup> succeeded in this. The folds in the interstitial tube are low, rather wide, extend longitudinally without convolutions, possess very little connective tissue (Figs. 5 and 6) and are covered with high cylindrical epithelium.

Farre<sup>14</sup> found a gradual transition from tubal to uterine type of mucous membrane and said that glands were found in the tube just outside the funnel-shaped entrance to the uterine cavity. In our case the transition from tubal to uterine epithelium was gradual but we found no glands beyond the uterine ostium. While the independence of the muscularis of the interstitial tube from the uterine muscle is distinguishable we found considerable interlacing with the outer tubal layer and Werth asserted that the independence holds true only for the submucous longitudinal layer, first described by J. Whitridge Williams.<sup>18</sup>

*The Ovum Cavity.*—The ovum cavity lies entirely within the musculature of the uterus, the fibers over the tumor being greatly stretched and thinned. The ovum capsule measures 8 mm. in thickness at the ovum bed or base of the tumor and 0.75 mm. at its summit (Figs. 3 and 4).

The ovum cavity itself measures 2.3 cm. in diameter and is filled with blood surrounding the ruptured and distorted ovum vesicle (Figs. 3 and 4). Scattered throughout the clotted blood numerous detached villi were observed; villi were also seen in contact with the ovum capsule, in some places they had eroded their way into the capsule and blood vessel walls (Fig. 8). Almost the entire cavity is lined with syncytial and Langhans' cells which are also found in the muscular layer, especially in the intramuscular connective tissue and they may be demonstrated

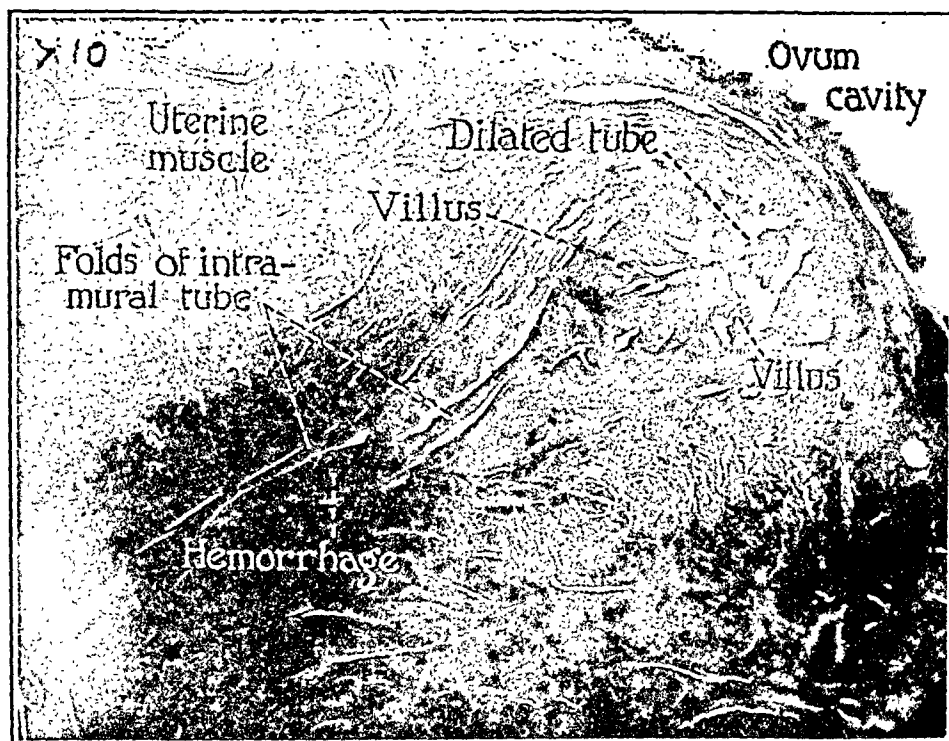


Fig. 6.—Microphotograph of part of proximal portion of pregnant intramural tube magnified ten times. Note tube dilated by ovum before rupture into present ovum cavity in uterine muscle, also note villi in dilated funnel-shaped portion.

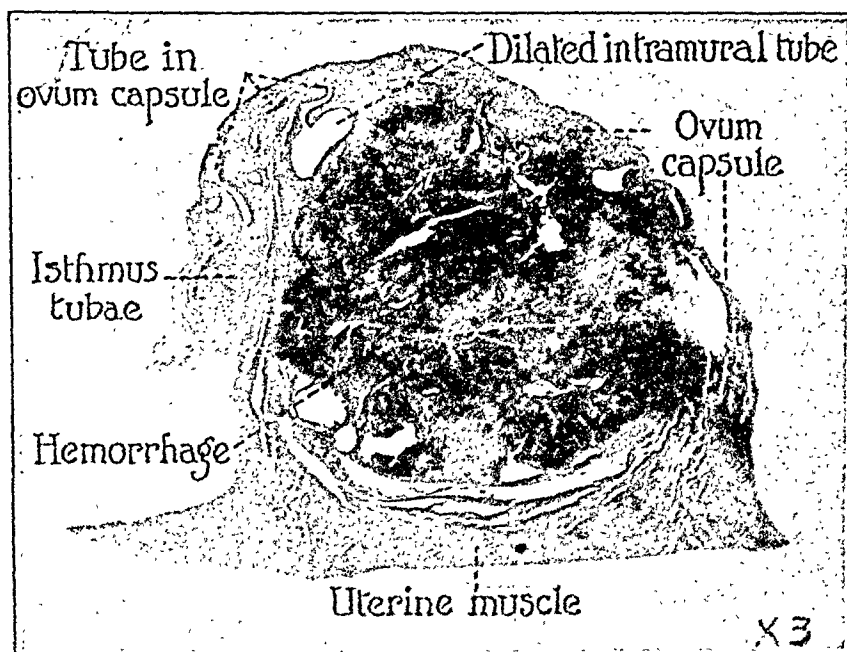


Fig. 7.—Photograph enlarged three times showing distal portion of ruptured dilated tube with intramural tube running from it through the ovum capsule to the isthmus tubae. This dilatation was originally united to the dilated portion of the proximal tube shown in Fig. 6. They are now torn asunder and forced 3.4 cm. apart by the hemorrhage.

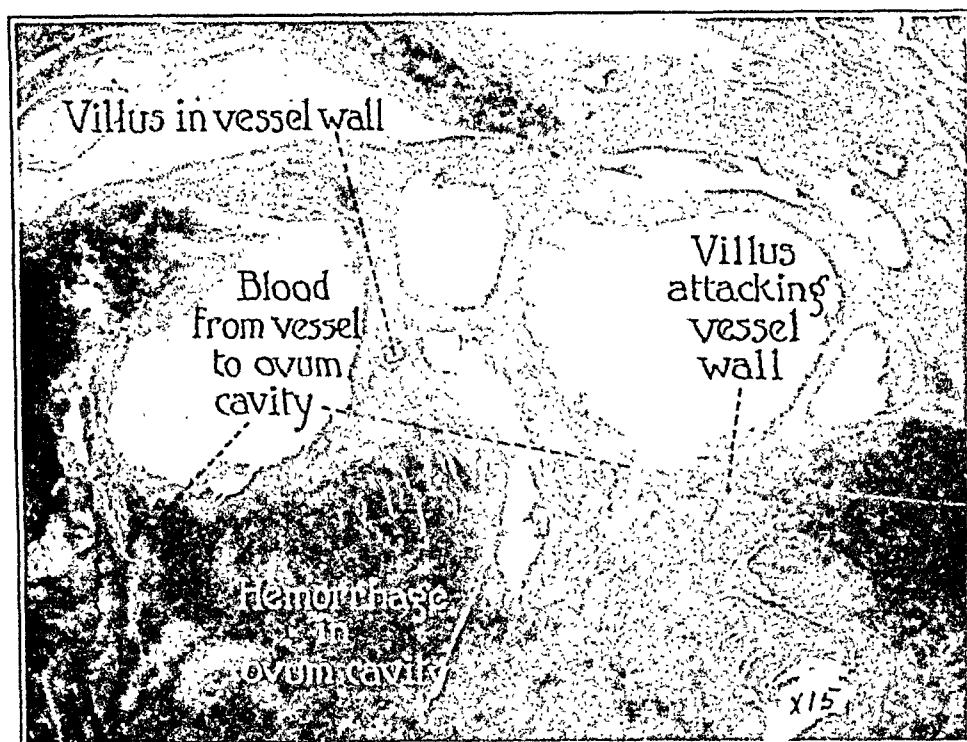


Fig. 8.—Photomicrograph of cornual vessels magnified fifteen times, showing vessels eroded by villi. Note villi in and attacking vessel walls, also blood flowing into ovum cavity.

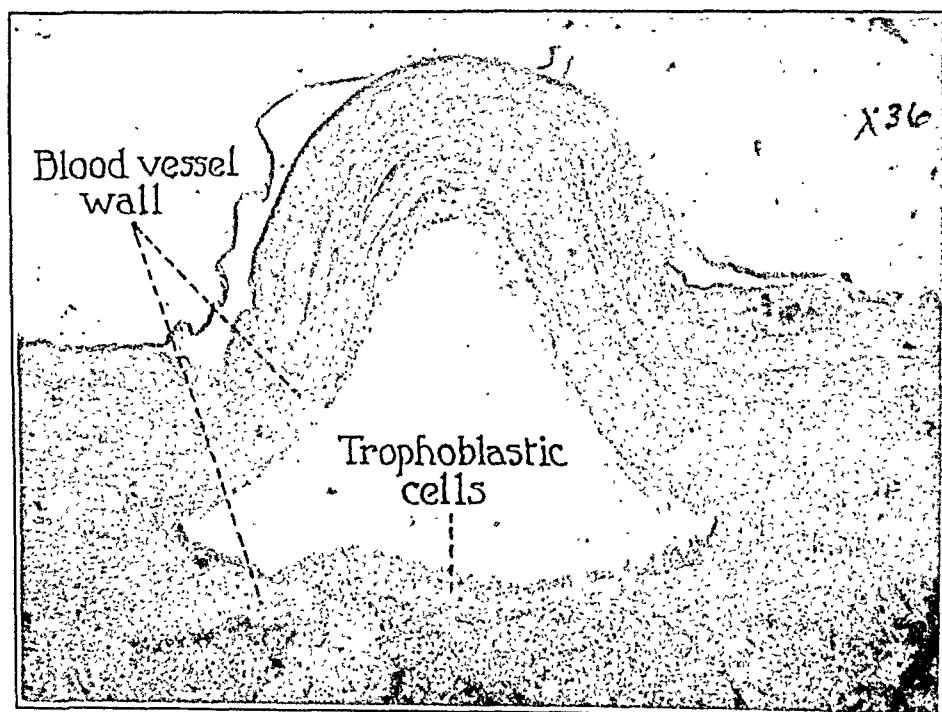


Fig. 9.—Photomicrograph magnified thirty-six times, showing trophoblastic cells in wall of vessel next to ovum cavity but none in opposite wall.

in the vessel walls. Figs. 9 and 10 show this infiltration in the wall of a vessel on the side next to the ovum with entire absence in the wall opposite.

*The Decidua.*—The endometrium in our case varies in thickness from 5 mm., nearest the internal os, to 9.5 mm. in the fundal region. In general appearance it is a perfect counterpart of normal uterine decidua (Figs. 4 and 11) except that it is in places hemorrhagic and some of the cellular elements, particularly in the glands, are in a state of regression.

The decidua is composed of compact and spongy layers and the decidual cells present the familiar mosaic appearance of normal decidua together with large numbers of lymphocytes.

The glands in the spongy layer are wide, in some places flattened, especially where hemorrhage within the decidua has compressed them (Fig. 4).

The epithelium of the glands is still present but seems to be in a marked state of degeneration both grossly and microscopically. Here and there it covers the

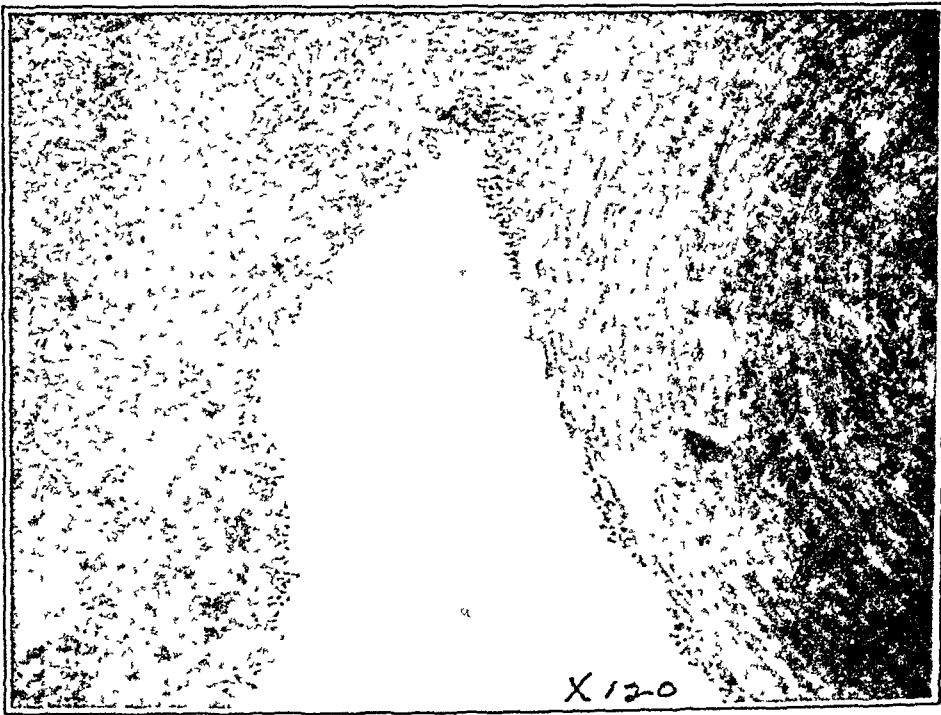


FIG. 10.—Photomicrograph of the same vessel as shown in Fig. 9 under higher power, magnified one hundred twenty times, showing same trophoblastic cells on ovum side and none opposite.

glands normally but it is loosened and irregular in many areas and nearly all of the glands contain shed intact epithelium and debris of broken down epithelial cells (Fig. 11) containing round bodies which Wertheim thought might be hyaline degeneration. The epithelium gradually becomes less columnar as the surface of the decidua is approached, being quite flat at the mouths of the glands.

According to Samson<sup>17</sup> the compact layer of the uterine decidua, in early tubal pregnancy, constitutes about one fifth of the decidua vera.

In our specimen the relative proportion of compacta and spongiosa varies as the fundus is approached, the proportion of compacta to spongiosa varying from approximately one sixth to one fourth of the decidual membrane (Figs. 3 and 4). The spongiosa lies between the compacta and the uterine musculature to which it is attached by tiny bridges of tissue carrying blood vessels and it is composed of a large mass of varying degrees according to the direction of cutting (Fig.

3 and 11). In some areas the glands look like flattened elongated tubes, especially in the neighborhood of hemorrhages within the decidua by which they appear to be compressed (Fig. 4). There is very little stroma between the glands and therefore relatively few decidual cells as compared to the compacta.

*Decidua Outside the Uterine Cavity.*—The perennial discussion of the occurrence of decidua other than in the cavity of the uterus would be greatly simplified if the distinction were always made between "true decidua" as a tissue or organ and "decidual reaction" in the form of decidual islands or isolated cells.

In sense of "true decidua" it is the consensus of opinion that it does not occur in tubal gestation outside the uterine cavity and that "decidual reaction" is frequently found elsewhere.

We find the same is true in interstitial pregnancy. We were unable to find either undoubted decidual islands or even decidual cells anywhere within the ovum sac.

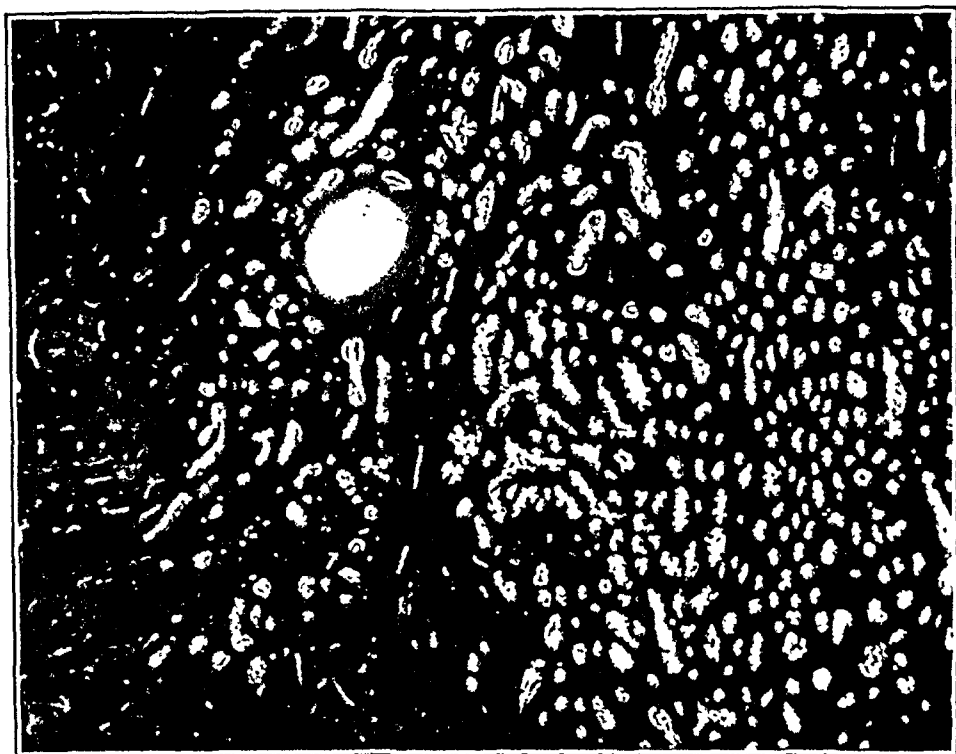


Fig. 11.—Photomicrograph magnified twenty times showing true decidua of uterine cavity. Note dilated vessel and degenerating epithelium and debris in glands.

Leopold,<sup>1</sup> Ulesko-Stroganow,<sup>2</sup> and Erna Glaesmer,<sup>4</sup> who have made the most extensive histologic studies, all made the same negative observations, although Glaesmer found "decidua-like" cells the origin of which she left in doubt. Her specimen, however, was considerably older than ours and in discussing these cells she stated that she had never found "decidua-like cells" in earlier cases.

Rashke,<sup>13</sup> on the other hand, claimed that he found an extensive decidual layer into which chorionic villi were embedded.

Werth<sup>3</sup> quoting these diverse opinions says: "The question as to the formation of decidua in the interstitial ovum bed demands further careful study after such controversial findings." Werth also declares that Rashke's report of his histologic findings "are not clear and convincing and the very incomplete gross description permits a doubt as to whether the specimen is an interstitial or a cornual pregnancy."



Braxton-Hicks,<sup>18</sup> as early as 1860, emphasized the lack of decidua in the ovum capsule and Von Pappel<sup>19</sup> laid special emphasis on the absence of decidua.

The existence of decidua in the wall of the ovum capsule has been asserted by Webster, Gebhard, Martin, Orthmann, Garkesch and von Franque, while Kühne, Griffith, Aschoff, Heinsius and Fühth have denied its presence.

Much of this difference of opinion is probably due to the failure to distinguish between "true decidua" and "decidual reaction." Some of the controversy, however, is due to differing interpretation of certain cells which Erna Glaesmer called "decidua-like" cells, some asserting that their origin is from the connective tissue hence decidual, some that they originate from muscle, and still others that they are chorial elements.

In our previous paper on tubal pregnancy<sup>12</sup> we came to the conclusion that these isolated cells were trophoblastic in origin, basing our opinion upon the apparent morphologic identity between them and the cells of the trophoblastic masses.

We have given more time to the study of the morphology and possible origin of these cells in this case than to any other phase of the subject.

In Fig. 11 we show undoubted trophoblastic cells infiltrating the wall of a vessel on the side toward the ovum and no such cells on the opposite side and in numerous places we have found morphologically identical cells which we believe are frequently interpreted as decidual cells, in fact, in our earlier investigations we thought they were decidual.

We confess that the courage of our convictions was rather weak until we were able to convince some trained microscopists of their trophoblastic origin. Aschoff and others have also taken this view.

We found nothing more than decidual islands anywhere else outside the uterine cavity but we found distinct "decidual reaction" outside the ovum capsule in the pregnant tube, quite marked on the side towards the uterine cavity, but found none in the tube distally. We found it also to a lesser degree in the opposite, non-pregnant tube.

*The Ovum Bed.*—The ovum bed is in the uterine musculature at the base of the tumor (Figs. 3 and 4). We were enabled, by virtue of having the uterine body as well as the interstitial pregnancy in our serial sections, to trace the tube throughout its entire length and thus discover the point of implantation and the location of the place where the ovum eroded itself through the wall of the tube into the musculature (Fig. 6). In this location more villi are found than at any other place in the ovum capsule, some of which are seen to be in the wall of the torn remnant of the tube (Figs. 3 and 7). At this point also the vessels from which the hemorrhage came are seen with the eroding villi in their walls and the blood coming from the openings made by them (Fig. 8).

There are large masses of trophoblastic cells in the ovum bed in addition to those still a part of the villi. These masses grow smaller and smaller the farther away we get from the ovum bed finally becoming scattered as isolated cells throughout the ovum capsule.

*The Ovum Vesicle.*—The vesicle is distorted, irregular and torn, (Fig. 3) possibly due to the pressure of the enormous hemorrhage. The most careful and prolonged search revealed no evidence of an embryo. Scattered throughout the blood in the ovum capsule numerous broken villi may be seen (Fig. 3) some of them are a part of the vesicle or in its immediate neighborhood; some entirely disconnected and still others in contact with the ovum capsule or partially buried in its wall and come in the act of eroding vessels. The wall of the ovum capsule is lined almost over its whole inner surface with the trophoblastic cells.

*Hemorrhage.*—The content of the ovum capsule is chiefly clotted blood (Figs. 3 and 4). The hemorrhage here is so great that it accounts for the size of the

tumor and we believe also for the fact that the embryonic vesical is distorted and broken (Fig. 3).

It also largely accounts for the tearing asunder of the interstitial tube forcing the torn ends 3.4 centimeters apart (Figs. 3 and 7).

This bleeding came from the large vessels at the cornu of the uterus (Fig. 3). This point we have proved by tracing the vessels through many slides to their origin at the horn and by searching for and discovering the point where the vessel walls were opened up by the villi (Fig. 8). When one notes the size of these vessels and the blood pouring from the eroded openings the amount of bleeding is no longer a source of wonder.

We also found bleeding in the pregnant proximal portion of the pregnant interstitial tube (Fig. 6) which we thought at first came from the ovum bed but we could not trace it to that origin and when we found blood also in the opposite non-pregnant intramural tube we concluded that the bleeding originated in the tube itself, probably due to a regressive process. No blood was found in the portion of the tube distal to the ovum. There was considerable hemorrhage in the uterine cavity which was more on the side toward the pregnancy. On cursory examination, this seemed to be coming from the pregnant tube, but more careful investigation showed that its origin was in the decidua compacta which it infiltrated; it also encroached upon the spongy decidua in some places, compressing and flattening the glands (Fig. 4).

While venous spaces (Fig. 11) may be seen throughout the stroma they are more evident in the compact layer where the hemorrhage took place. Fig. 11 shows that the hemorrhage has occurred within the decidual tissue and is not flowing over it from the ovum above. We came to the conclusion, on account of having traced the bleeding in the ovum capsule and the decidua to their sources in the immediate neighborhood, that all other hemorrhages found had a similar local origin.

#### SUMMARY

Interstitial pregnancy differs from other types of ectopic gestation only as the peculiar anatomic conditions which surround it may modify its progress.

For example: the course and structure of the intramural tube leads to implantation near the posterior wall of the fundus resulting in the characteristic tumor; the structure of the tube and uterine wall favor early rupture of the tube and late rupture of the ovum capsule, and the large size of the vessels at the cornu of the uterus which may be eroded explains the unusual hemorrhage.

The behavior of the decidua is identical with other forms of ectopic pregnancy. On account of having the whole body of the uterus we have been enabled to study some features of the condition not hitherto possible, such as the tracing of the pregnant tube throughout its entire length from the uterine cavity to the ovum capsule and thence, in the wall of the ovum capsule, to the free portion of the fallopian tube. The opposite tube was also at our disposal for comparison, as a normal structure, with the abnormal pregnant tube and the serial sections permitted us to make comparative measurements of both tubes. These sections also enabled us to make accurate meas-

urements, for the first time, of the thickness of the uterine walls on both the pregnant and nonpregnant side.

We were fortunate also in possessing a specimen in which we could locate the place of implantation and rupture of the tube as well as the exact source of the hemorrhage and finally the sections of the whole organ which preserve all the anatomic relations permitted comparative anatomic and histologic studies.

#### CONCLUSIONS

1. Interstitial pregnancies are always found within the musculature of the uterus because of the early rupture of the tube.
2. The age of our ovum is probably less than three weeks, inasmuch as the uterus was removed twelve days after the date of the expected but skipped menstruation.
3. Rupture of the tube and escape into the uterine musculature occurred before this.
4. At the site of implantation and rupture the lumen of the tube measured 4 mm. in diameter or two and a half times the normal measurement, hence the tube must have ruptured when it had attained this size.
5. The site of implantation and rupture is proved by finding the tube dilated and villi within the dilated portion and in the wall at the point of rupture.
6. No uterine glands were seen in the tube beyond the uterine ostium.
7. The transition from uterine to tubal epithelium is rapid but not abrupt.
8. The tubal musculature is distinct from the uterine muscle but the outer layer is not always easy to differentiate.
9. The uterine muscle hypertrophies very early and the wall is thicker on the pregnant side.
10. True decidua is found only in the uterine cavity.
11. "Decidual reaction," is present in both tubes but is entirely absent in the ovum capsule.
12. The so-called "decidua-like" cells are probably trophoblastic in origin.
13. Hemorrhage in the uterine cavity originates within the decidua, and bleeding elsewhere probably also originates locally.
14. Interstitial pregnancy repeats most of the features of ectopic gestation elsewhere, modified, however, by the peculiar anatomic conditions of its location.

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119 INSTITUTE OF ANATOMY.

## THE USE OF NOVOCAINE IN OBSTETRICS\*

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THE possibilities for the use of novocaine in obstetrics are many. At the last meeting of the American Gynecologic Society, F. C. Irving<sup>1</sup> reported thirty-one cesarean sections performed under morphine, scopolamine and local anesthesia with novocaine upon patients suffering from cardiac, renal or pulmonary disease. I have had one such case, a secundipara, twenty-three years old, with mitral stenosis, bilateral bronchopneumonia, and marked nitrogen retention, the blood urea nitrogen reaching 58.3 mg. per 100 c.c., who was operated upon with the technic described by Irving with gratifying results. The patient remembered nothing of being carried to the operating room or of the operation. Her postoperative course was uneventful except for a few days of abdominal distention and the consequent cardiac embarrassment. She, however, died of her heart condition complicated with recurring pleuritic effusion, 31 days later. The baby weighed  $4\frac{10}{16}$  pounds at birth. He is now seven and one-half months old, and is thriving.

I have also found novocaine helpful in one case of vaginal cesarean section. This patient was a nullipara who came under my care at the end of her sixth month of gestation, with a systolic pressure of 210 mm., marked albuminuria with granular casts, and a dimness of vision so great that she could not recognize persons. Under the topical use of a 5 per cent solution of cocaine, I was able to introduce my finger into the uterus. A No. 5 Voorhees bag was placed, the bag was weighted, and the patient was given morphine and scopolamine and a proctoclysis of glucose solution. After 36 hours there was no further dilatation. Dr. Emory Hill gave a very unfavorable opinion of her eyegrounds. It seemed imperative that her uterus be emptied. Thirty-five c.c. of a 2 per cent novocaine solution (without adrenalin) were injected into the sacral canal. This gave sufficient anesthesia for the dissection of the bladder and a four inch incision in the anterior wall of the cervix.

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When, however, I introduced my hand into the uterus, the patient became restless, and it was deemed best to give her nitrous oxide-oxygen with a little ether for the extraction. The suturing was completed under the sacral anesthesia. The baby was stillborn. The mother made an excellent recovery except that she has only three-twentieths vision.

It is, however, of the use of novocaine sacrally, or epidurally, in parturition that I ask your consideration. Stoeckel<sup>2</sup> in 1909, inspired by the work of the French urologist, Cathélin, with cocaine, used novocaine sacrally in 141 normal cases. Eighty-nine of them were primiparae. It was effective in varying degrees in 111 cases. The passage of the head through the vulva was entirely painless in nine and only slightly painful in sixteen of the patients. In 23 cases the pains were weaker and less frequent. This was especially noticeable when the injections were given early, and in one case the contractions ceased entirely and did not reappear for four days. This suggested to him that possibly abortions and premature labors could be stopped by this method. He noticed a slight atony and a little more bleeding until adrenalin was added to his solutions. The formula that gave him the best results was:

Novocaine	0.15
Suprarenin	0.000325
Aqua destill.	3.0
Normal salt sol.	30.0

The following year, Schlimpert and Schneider<sup>3</sup> reported their experiences with 155 gynecological and obstetrical cases in the Freiburg clinic. Only eleven were obstetrical. As an unassisted means of relieving the pains of childbirth these authors thought sacral anesthesia was worse than useless except in those patients who came into the clinic in the perineal stage. They recommend its use as an adjunct to "Dämmer-schlaff" to afford the patient relief until the morphine and scopolamine have time to act. Nevertheless the next year Schlimpert<sup>4</sup> reported upon 149 obstetrical cases with this method. Rieländer<sup>5</sup> reported his experiences with sacral anesthesia in 65 cases, forty-six of them being primiparae. In twenty-three instances the use of novocaine epidurally was preceded by the nasal use of cocaine after the Koblanek method. In one-half of his patients the pain of labor was lessened. He, however, was unable to repair the perineum without causing pain. Baum<sup>6</sup> also used the "Stoeckel-Koblanek" method, reporting 50 cases (33 primiparae). Tobiaszek<sup>7</sup> reported 30 cases (17 primiparae) with little effect. There were three forceps deliveries and the operation was in every case painful. There was poor contraction of the uterus after the third stage in 40 per cent. He used a one-half per cent solution. Låwen<sup>8</sup> about this time called attention to the fact that one must use from a 1½ per cent to a 2 per cent solution of novocaine in order to get surgical anes-

thesia with sacral injection. The maximum dose that he recommends is 0.4 gm. Zweifel<sup>9</sup> reports three cases of skin necrosis at the site of injection. He attributes this to using 10 per cent iodine for the skin disinfections. Kehrer<sup>10</sup> used much larger quantities than had hitherto been employed, as much as 60 c.c. of a 1.5 per cent solution of novocaine with a little adrenalin and sodium bicarbonate. He regarded the method as an excellent one for gynecological operations, but rejected it for obstetrical operations. Piantoni<sup>11</sup> in 1913, was struck with the rarity of lacerations following its use. In 1921, Schellekens<sup>12</sup> reported favorable results in eight cases. He used 20 c.c. of a 2 per cent solution. Oldham<sup>13</sup> is enthusiastic about his experience, covering a period of two years. He reports 6 cases, in two of which forceps were used, with excellent results, but does not give any data about his results in his other cases. Recently Mecker and Bonar<sup>14</sup> have published their results with 90 obstetrical cases. Their work is beautifully illustrated, and they go into the technic of the injections and the anatomy of the sacral canal and the sacral nerves in the most thorough manner. Their cases were unselected, 54 being primiparae and 36 multiparae. Twenty-one were delivered with forceps, 3 by version, and 6 were breech extractions. Relaxation of the perineum was the outstanding feature, so much so that episiotomy was not necessary. In the spontaneous deliveries the authors experienced the greatest difficulty in determining the proper time for the injection. They state, as did also Schellekens, that there was a tendency to apply the remedy too early in primiparae and too late in multiparae.

#### TECHNIC

In most of my cases I used a 2 per cent solution of novocaine with 0.3 c.c. of 1:1000 adrenalin solution to each 40 c.c. of the novocaine solution. I have also tried a one per cent solution, but the duration of the anesthesia was shorter and the anesthesia apparently less complete. In my last cases I have been using a 1½ per cent solution which seems to give equally as good results as the stronger solution. The patient is put in the left lateral position with the back arched and the knees drawn up as recommended by Cathélin.<sup>15</sup> The skin is prepared with iodine and alcohol. A little of the solution is injected subcutaneously with a fine needle, as a preparation for the larger needle. In my earlier cases I used only 20 c.c. for an injection and in one very satisfactory case I used only 10 c.c. After Mecker and Bonar's first article appeared, I increased the amount to 30 and 35 c.c. of fluid. The patient is then turned upon her back. The anesthesia begins in from 10 to 15 minutes. Labat<sup>16</sup> recommends a nickel needle that is unbreakable. The importance of this was impressed upon me a short while ago. I was helping the students in the out-patient service to do a Hirst<sup>17</sup> intermediate repair of the perineum. The patient was a mus-

cular negress who had given birth to her first child six days previously. I introduced an ordinary lumbar puncture needle into the sacral hiatus in the usual manner, removed the stylet, and turned to fill the syringe with novocaine solution. The patient straightened out her thighs and partly raised her shoulders so as to turn her head and see what I was doing. The students heard the needle snap and the direction of the needle was greatly altered. The needle was withdrawn and when measured with the stylet it was seen that three-quarters of an inch was missing. The patient was taken to the hospital and the missing part of the needle was removed from the sacral canal under local anesthesia.

#### NERVE SUPPLY

A discussion of block anesthesia necessarily demands a discussion of nerve supply. That of the uterus is well understood anatomically. The description and cuts found, for instance, in the 1897 edition of Quain's<sup>18</sup> Anatomy still hold good. The nerve fibers of the uterus are derived principally from the hypogastric plexus, but some filaments are also added by the third and fourth sacral nerves. They are directed upward with the blood vessels between the layers of the broad ligament to the sides of the neck of the uterus (*ganglion cervicale* of Frankenhäuser). The fundus of the uterus also receives an offset from the ovarian plexus. The function of these nerves, however, is still a matter of dispute. According to Head<sup>19</sup> the sensory fibers of the fundus arise from the 10th, 11th, and 12th dorsal and the 1st lumbar and those of the os from the 2nd, 3rd, and 4th sacral segments. On the other hand Langley and Anderson<sup>20</sup>, by stimulation experiments and by tracing the degenerated fibers after severing the nerve roots, proved that in the rabbit and cat, the sacral nerves send neither afferent nor efferent fibers to the internal generative organs. This does not accord with the views of clinicians.<sup>21</sup>

The vasoconstrictors run from the lumbar segments by way of the white rami to the sympathetic and to the inferior mesenteric ganglia, thence by way of the hypogastric nerves to the uterus (Langley and Anderson). Gaskell<sup>22</sup> says that both vasoconstrictors and vasodilators are contained in the sympathetic, while von Basch attributes the latter to the sacral nerves.

When it comes to considering the motor fibers to the uterus, one must not only divide the organ into two parts, the fundus and the cervix, but must also think of it in its embryonal condition as a tube with a longitudinal and a circular coat of muscle fibers. Fellner,<sup>23</sup> for instance, states that the "nervi erigentes" are motor for the longitudinal muscles of the fundus and for the circular muscles of the cervix and are inhibitory for the circular muscles of the fundus and the longitudinal muscles of the cervix. The hypogastric nerves on the other hand are motor for the circular muscles of the corpus uteri and for the longitu-

dinal muscles of the cervix and are inhibitory for the longitudinal muscles of the fundus and for the circular muscles of the cervix. Keifer<sup>24</sup> shares this view, maintaining that the os is a true sphincter and dilates at the approach of the peristaltic wave. On the other hand von Basch and Hofman<sup>25</sup> state that stimulation of the hypogastrics causes a contraction of the circular muscles of the entire uterus, while stimulation of the cerebrospinal nerves causes the longitudinal fibers to contract. Langley and Anderson find that stimulation of the lumbar nerves causes a contraction of all the fibers of the uterus and vagina in both rabbits and cats. Cushny<sup>26</sup> found that hypogastric stimulation produced, in the rabbit, powerful contraction of the whole uterus irrespective of its pregnant or nonpregnant condition. However in one pregnant rabbit stimulation of this nerve induced pure inhibition. In the virgin cat hypogastric stimulation was inhibitory, the uterus undergoing relaxation. On the other hand in the cat during pregnancy, or as a general rule, after pregnancy, hypogastric stimulation led to strong and immediate contraction just as in the rabbit. It is supposed, therefore, that inhibitory fibers prevail in the virgin, but during and after pregnancy the action of the motor fibers conceal their presence. Whitehouse and Featherstone<sup>27</sup> who noted the behavior of the uterus at cesarean section when operating under spinal anesthesia and also the behavior of the uterus of rabbits under the same treatment, conclude that when the lumbar cord is narcotized the uterus always contracts and does not relax until the drug ceases to act. The contraction seems to involve the circular muscle fibers only, the longitudinal ones being unaffected. The lower uterine segment and the cervix also appear to be involved in the increased uterine "tone." The action is the same regardless of the stage of gestation.

The nervous mechanism of parturition is still a matter of considerable speculation. Centers are said to exist in the cortex, the medulla, the cerebellum, the lumbar enlargement, and in the uterus itself.<sup>28</sup> Kehrer,<sup>29</sup> Kurdiosky,<sup>30</sup> Helme,<sup>31</sup> Keye,<sup>32</sup> and others have shown that the uterus of animals, when removed from the body and kept under proper conditions of moisture and heat, has regular rhythmic contractions. Franz<sup>33</sup> has shown that the same is true for strips of human uterus. Sir James Y. Simpson<sup>34</sup> removed the dorsal and lumbar cord from a number of sows a few days before parturition was due. The animals that survived, littered normally until the last fetus, which was not delivered. On the other hand, Goltz and Ewald<sup>35</sup> completely excised the cord of a bitch from the middorsal region downwards, and report that after the operation the animal went into normal "heat," became pregnant and in due time produced a litter of pups. In human beings with paraplegia<sup>36</sup> at the level of the middorsal region, labor sets in and proceeds normally but painlessly. In some of the cases reported it was noted that there



was a lack of proper pause between the contractions. In Brachet's case, however, where the spinal lesion apparently involved the lumbar cord, the uterus failed to make normal contractions and the child was eventually extracted with forceps. DeLee mentions a similar case of his own. The subject is full of contradictions and as Vignes<sup>37</sup> well says, needs further investigation.

To summarize, I can do no better than to give Marshall's<sup>38</sup> conclusions upon this very perplexing subject. "(1) The act of parturition is partly automatic and partly reflex, these actions corresponding in the main to the first and second stages of labor, respectively, the spinal reflexes usually commencing as soon as the membranes have ruptured. (2) Direct communication with the brain is not essential for the proper co-ordination of uterine action, but the brain appears to exercise a controlling influence of some kind. Thus emotions often become a hindrance to the progress of parturition. It would seem possible that this inhibition of uterine contractions is brought about by an inhibition of a center in the brain. (3) Direct communication between the uterus and the lumbar region of the cord is generally essential for the occurrence of those rhythmical contractions which take place during the progress of normal labor. There is experimental evidence upon animals, however, that the uterus is sometimes able automatically to expel its contents, at least as far as the relaxed portion of the genital tract, even when entirely deprived of all spinal influence."

#### SAFETY

The experiences in general surgery would indicate that epidural anesthesia is relatively safe. Zweifel<sup>39</sup> was able to collect 10 fatalities in 4,200 cases on record. In only three could the anesthetic be held responsible and in these 0.6 gm. was the smallest dose used. No mishaps have been recorded with doses of 0.4 or 0.5 gm. The obstetrician has also to consider the influence of the anesthetic upon the child and upon the uterus, especially in connection with the question of postpartum hemorrhage. The testimony of those who have used this method in obstetrics is, that it has no influence upon the child, and indeed it is difficult to see how it could have a deleterious effect.

The question of increased postpartum bleeding is not so easily dismissed. One would rather expect with the marked atony of the lower uterine segment that follows sacral anesthesia, to get hemorrhage in cases of low implantation of the placenta. This has not proved to be so in the few cases of placenta previa that I have had. Stoeckel<sup>2</sup> noticed a little more postpartum bleeding than usual until he added adrenalin to his solutions and Tobiaszek<sup>7</sup> stated that 46 per cent of his cases had poor contraction of the uterus after the third stage. In a small number of my cases there was a troublesome trickling of blood in spite of a firmly contracted fundus and even of vaginal packing. I was puzzled

to account for this until I explored the cervix and found the bleeding to be coming from small tears that ordinarily would have caused no symptoms. A repair of these stopped the bleeding completely. This possibility, I believe, must be borne in mind in using this form of anesthesia in obstetrics.

#### CLINICAL RESULTS

My experience with sacral anesthesia consists of 103 cases including the vaginal cesarean section detailed above. Three were cases of incomplete abortion in which the uterus was cleaned out with the finger or with placental forceps under the guidance of the finger. Three were inevitable abortions. One was a case in which the uterus was emptied at the second month on account of postdiphtheritic paralysis involving the pharynx, the larynx and the heart, extreme prostration, and pernicious vomiting. One was a nullipara in the sixth month with a placenta previa. Sacral anesthesia was used to introduce the bag, but she delivered herself spontaneously without anesthesia. In the remaining 94 cases, sacral anesthesia was used in delivery.

Many of the patients complained of feeling a little queer immediately after the injection. Two had noisy attacks of hysteria. One had tetany that lasted for a few minutes. A few vomited shortly after the treatment, and a great many looked a little pale about the lips for five or ten minutes. One case, a primipara who was seen in consultation after she had been in labor twenty-four hours, had marked and rapid variations in blood pressure. When I first saw her, the systolic pressure was 158 mm. She was given 35 c.c. of a 1½ per cent novocaine solution with 5 minims of adrenalin. Before I had hardly finished the injection, the patient complained of feeling queer. The systolic pressure was found to be 220 mm. It fell some ten points every two minutes and within eight minutes it was 160 mm. The patient then felt well and had an excellent anesthesia. An easy version and extraction was done. The patient lost more blood than usual in the third stage, perhaps 400 c.c. Just after the expulsion of the placenta her color became ashen and perspiration stood out on her forehead and lips. The blood pressure was 75/40 and fell in a few minutes more to 60/20. There was no external bleeding. The uterus was contracted. The patient was somnolent, but when aroused she said she felt perfectly well, and persisted in talking about what a painless delivery she had had. After 200 c.c. of saline with ten minims of adrenalin were given subcutaneously, the blood pressure gradually rose. Her physician tells me that for some time he had been watching her on account of extreme nervousness and rapid pulse. There was no visible enlargement of the thyroid.

Usually, there is little change in the blood pressure, possibly a slight rise at first and a corresponding fall in the course of 10 or 15 minutes.

The chart shows the behavior of the blood pressure and pulse in an average case.

Seventy of the 103 cases had excellent anesthesia. In this group were all the cases of abortions, one case in which a Voorhees bag was placed, 50 versions and extractions, eight forceps, three breech extractions and one spontaneous delivery. Ambrosini<sup>40</sup> got good anesthesia in 78 per cent of his gynecologic cases. In 22 cases there was partial anesthesia. This group includes all those patients who had evidences of local anesthesia, but who for various reasons had also a general anesthesia. Most of the cases in which I used a one per cent solution of novocaine fall into this group. In several instances the anesthesia was complete but wore off before delivery. In other instances the anesthesia was good, but the patients wanted to be put to sleep, either because they were asleep at previous deliveries, or else were nervous and apprehensive. This group also includes those cases that would not cooperate either

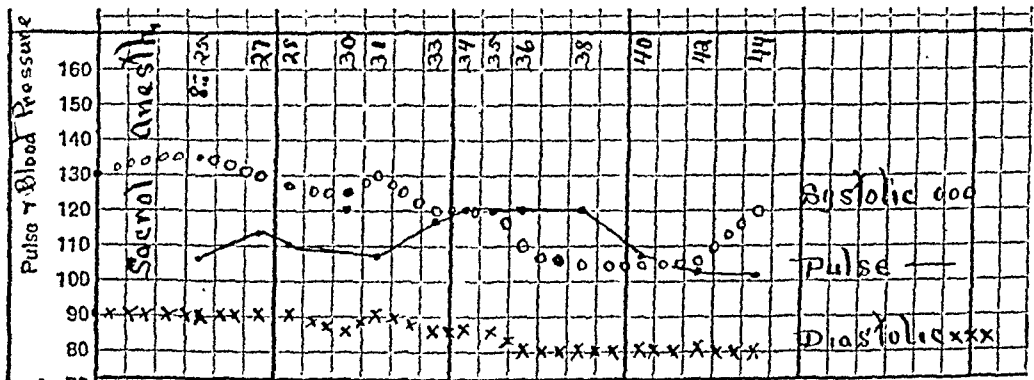


Fig. 1.—Chart showing the usual behavior of the pulse and the systolic and diastolic blood pressure after sacral anesthesia. Each square horizontally represents a minute.

because they had a fixed idea about needing chloroform or were under the influence of hyoscine. There were ten failures. Five of these occurred in the first fifteen cases and were due no doubt to faulty technic. Among the latter five were two cases whose sacral canal was so shallow anteroposteriorly that I was unable to get my needle into it.

The most constant feature of the sacral anesthesia is the marked relaxation of the perineum and the cervix and the absence of pain. (Figs. 3-6.) The tone of the body of the uterus varied somewhat. In only two instances was it so great as to prevent my doing a version. The lack of any anesthesia of the abdominal muscle complicated somewhat the management of the head in these cases. Forceps were applied to the aftercoming head eight times. Mecker and Bonar<sup>14</sup> remark on the ease with which accouchement forcé can be done. I have dilated the cervix manually twice under sacral anesthesia. One patient was a multipara with a systolic pressure of 220, headache and vomiting. She was at term and was quarantined

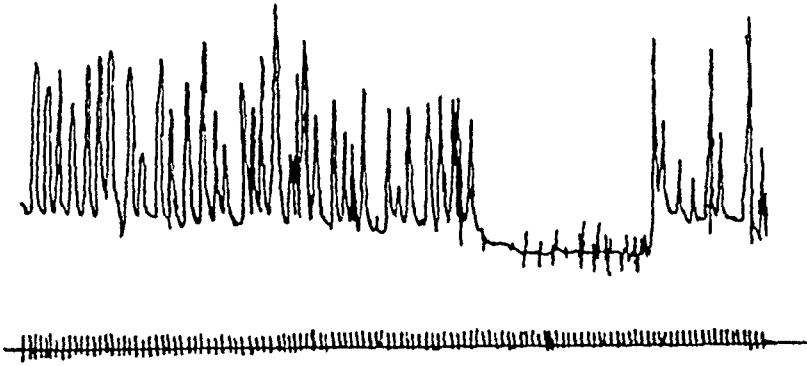


Fig. 2.—India ink tracing of a hystero-gram ( $\frac{1}{2}$  actual size) showing the psychic effect of sacral puncture without injection of any drug. This patient had so shallow a sacral canal that I was unable to introduce a needle. Note contractions stopped for 28 minutes. The timer marks minutes in this as well as the subsequent figures.

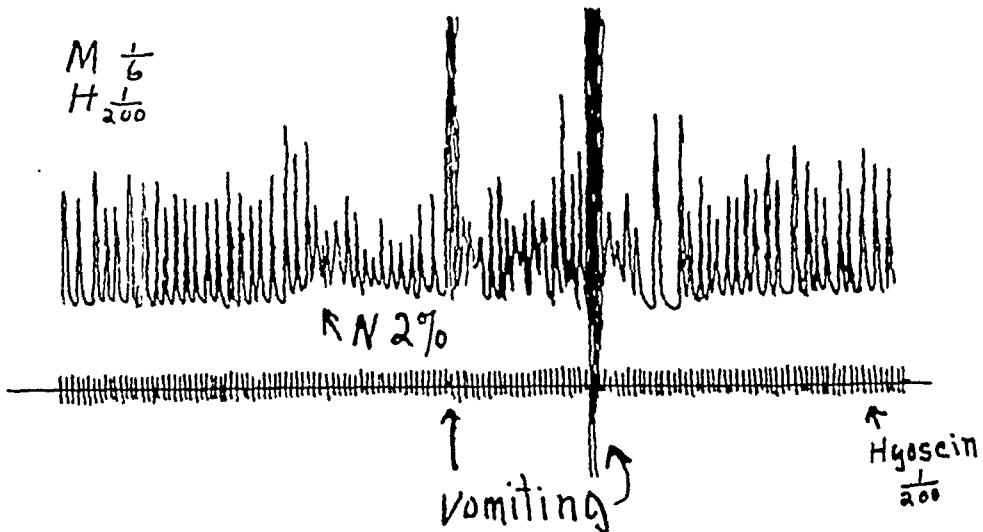


Fig. 3.—Tracing of a hystero-gram ( $\frac{1}{2}$  size) showing the usual effect of sacral injection of novocaine (2 per cent) upon the strength and frequency of uterine contractions. This patient received  $\frac{1}{6}$  grain morphine and  $\frac{1}{200}$  grain of hyoscine  $2\frac{1}{2}$  hours before the novocaine was injected. In this case the contractions resumed their former strength in 55 minutes. The patient felt no pain for  $1\frac{1}{2}$  hours at which time she was given  $\frac{1}{200}$  grain of hyoscine.

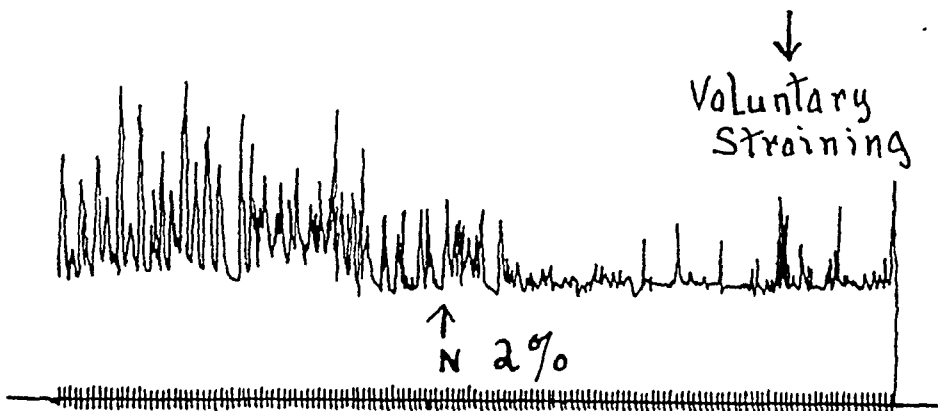


Fig. 4.—Tracing of a hystero-gram ( $\frac{1}{2}$  size) showing the entire cessation of uterine contractions for  $1\frac{1}{4}$  hours after injection of 2 per cent novocaine.



caine solution into the sacral canal, and Kielland's forceps were applied (but not in accordance with the Kielland technic). I delivered the head with great deliberateness and comparative ease, taking 55 minutes for the operation. There was no tear of the perineum and only the slightest sort of red mark on the baby's cheeks.

#### COMPLICATIONS

Two of the patients had placenta previa of the marginal variety. Three were toxic, one had an organic heart disease, one acute bronchitis, and one a prolapsed cord. There was one set of twins. One patient had a postpartum hemorrhage that was easily controlled by packing, and one had postpartum eclampsia with recovery. The baby died on the third day and autopsy showed a marked degeneration of the liver. The twins were premature and died on the sixth day of pneumonia. One other baby died about the same time of pneumonia. The baby with a prolapsed cord had scarcely any pulsation when first seen. The delivery was in another town and was complicated by the electric lights going out just as I was in the midst of a version. There was one other death, that of cerebral hemorrhage in an infant delivered by version.

#### DISCUSSION

It is interesting to speculate what effect novocaine, given into the sacral canal, has upon parturition. There are certain very definite results. Most noteworthy is the marked relaxation of the lower portion of the birth canal. The vagina and the external os are very atonic. In contrast to this is the tonicity of the fundus. The height of the line of demarcation between the tonic and the atonic portions of the uterus varies somewhat in different patients. It is especially evident after delivery. In one of my early cases, in which I had occasion to make a vaginal examination, the cervix was so relaxed and the fundus so small and hard in contrast, that it seemed as if it would certainly fall through the cervix. This sensation was so startling that I packed the vagina to prevent what seemed to be an inevitable inversion of the uterus. On the other hand in only two cases was the fundus so contracted before delivery that I was deterred from doing a version.

There is also a complete relief from pain. This is true whether the uterus contracts or not. The effect upon uterine contractions, however, is variable. In the majority of patients, there is a cessation of contractions or at least a diminution of their force for 20 or 60 minutes after the injection. The pains then return to their former frequency and force. In a few cases the cessation of uterine contractions lasts for 50 minutes or more. In one of my cases in which a Voorhees bag within the cervix was connected with a manometer and a record of the contractions obtained, there was no lessening in the force of contractions, and an actual increase in their frequency.

If our ideas as to the nervous mechanism of parturition are correct, i. e., the first stage is largely automatic and the second stage partly reflex, then we would expect sacral anesthesia to interfere seriously with the spontaneous expulsion of the fetus. Such has certainly been my experience. Probably there would have been more than one spontaneous delivery in the 62 deliveries in which I obtained perfect sacral anesthesia, had I waited longer. Meeker and Bonar<sup>14</sup> speak of instructing the patient how to use her abdominal muscles. I have had very little success in such instruction. Recently I delivered a patient in her home that illustrates this. The patient had had two easy spontaneous deliveries previously. When I first saw her she was having good second stage pains with beads of perspiration standing out on her forehead. I injected 35 c.c. of one and one-half per cent novocaine solution into the sacral canal and within 10 minutes she straightened out in bed and all her pains had ceased. The uterus could be felt to harden rhythmically. The head was on the perineum and needed but a few straining efforts for its delivery. I explained all this to the patient and she said that she seemed just not to know how to strain. After waiting an hour I lifted the head over the perineum with forceps.

#### CONCLUSIONS

1. Novocaine sacrally produces marked relaxation of the perineum and the external os, with anesthesia to pain and also largely to pressure.
2. It produces moderate increase in tone of the fundus.
3. The effect upon uterine contraction is variable.
4. It is an excellent procedure for operative obstetrics, but its value for spontaneous delivery is dubious.

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(For discussion see page 106.)

## URETERAL STRICTURE IN OBSTETRICS; WITH SPECIAL REFERENCE TO MULTIPLE ABORTIONS (RENAL) AND TO PYELITIS OF PREGNANCY\*

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**B**EFORE presenting pyeloureterograms of patients with the pyelitis of pregnancy and the puerperium, I wish to give a brief résumé of facts and theories on ureteral stricture derived from a study of over 2,000 cases. In speaking to an audience of urologists I no longer consider this to be necessary, for they are supposed to be familiar with my viewpoint, no matter how widely they may differ; but for an audience composed of workers in other branches of medicine the general subject of ureteral stricture is still an unfamiliar one.

Most ureteral strictures are due to an intrinsic inflammatory condition of the ureteral walls resulting in a narrowing of the ureteral lumen. It is probable that developmental errors of fetal life account for some strictures.

From a perusal of present day literature it would appear that most urologists look upon a stricture as a lesion with fixed and permanent characteristics; hence the frequent use of such terms as "wide caliber" and "narrow caliber" stricture. As a matter of fact, for days, weeks or months a stricture may have a caliber sufficiently wide to permit such good drainage that the patient is not aware of any defect; and yet within an hour he may be the victim of a severe renal colic which may persist for hours or days of the most intense suffering. What has happened?

The "wide caliber" stricture has developed a fresh inflammatory reaction and it suddenly becomes a "narrow caliber" stricture. The premenstrual or menstrual congestion, the added congestion of a pregnancy, or possibly pressure or displacements due to pregnancy, or inflammation of neighboring organs, such as the appendix or fallopian tubes, have added the factors that cause a further narrowing or a complete closure of an already narrowed area in the ureteral wall. Other common factors bringing about a congestion or a fresh

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inflammation in a quiescent stricture area are: getting the feet wet, becoming chilled, and various traumatic factors such as a long rough ride, heavy lifting, sudden twisting or wrenching of the body in falls or accidents, abdominal operations, and trauma of childbirth. Many patients date the onset of their illness from a definite hour and attribute the attack to one or other of the above causes. In all probability such traumatic factors are seldom the actual cause of a stricture, but it is certain that they not infrequently stir up so much congestion in a previously quiescent stricture area, that from this time on the symptoms may persist. On the other hand, the symptoms may disappear in a short time, only to reappear with some future exposure or trauma. Such observations are important in the medicolegal field.

Experience in the care of stricture cases has not only led to the above conclusions which seem to alter some of our previous conceptions of the so-called wide caliber and narrow caliber strictures, but it has also utterly exploded some of the ideas still being tenaciously cherished by many urologists. Two of their favorite dicta are: (1) that infiltration of the ureteral wall sufficient to cause a narrowing of the lumen must result in gross dilatation above; and (2) that gross changes in the upper tract due to stricture must cause symptoms. The answer to these pronouncements is: logically they seem to be correct; experimentally many exceptions are found.

*Etiology.*—We have had sufficient experience with ureteral strictures to state with some degree of certainty that they usually arise from some distant focal infection and that by far the most common foci are in the tonsils, teeth, and sinuses. Some of the less common foci are probably in the gastrointestinal tract, including the gall bladder and appendix, in the cervix, or in any portion of the body where there exists a chronic suppurative process.

The reasons for believing that distant focal infections can cause ureteral stricture are briefly: (1) the almost universal location of the strictures near groups of lymph glands, namely, in the broad ligament region, and near the bifurcation of the anterior iliac vessels; (2) the frequency with which one gets a history of the primary onset of ureteral symptoms after an attack of grippe, tonsillitis, or sinusitis; (3) the frequency with which patients who have been relieved of their ureteral stricture symptoms come back after the lapse of months or years with the history that they had been well until recently, but that the symptoms had returned after an attack of grippe, tonsillitis, sinusitis, or after having some dental work done; (4) an occasional patient, after operation for one of these distant focal infections will complain more of a recrudescence of the ureteral pain than of the pain in the operation area. Cystoscopy in such cases, a week or ten days after the operation, sometimes reveals a marked redness, swell-

ing, and edema of the mucosa about one or both ureteral orifices; (5) many patients make very little or no progress under treatment for the ureteral condition until the original area of distant focal infection has been eliminated.

In order to test the theory of the causal relationship between focal infections and stricture, it has been my practice to be conservative about the possible infection foci until a test has been made of ureteral treatments alone, simply telling the patient that if we are not successful in giving permanent relief we may direct radical attention to the focal infection areas. It has been surprising to see what a large proportion of patients fail to remain free from ureteral symptoms until the infection foci have been eradicated. Of course, many stricture patients before reaching the urologist have already been treated for their focal infections, because of previous headaches, throat or bronchial inflammations, arthritic or other conditions.

*Age.*—I have treated stricture in patients ranging in age from three to seventy-eight years. Many of the patients seen in later childhood or early adult life have had definite stricture symptoms since early childhood.

*Sex.*—Many urologists are excusing their disregard of this most important of all urologic lesions with the plea that stricture may possibly occur fairly frequently in the female but is not found in the male. The first answer to this is that strictures were rarely found in the female until they were looked for. On a recent visit to New York I found Lowsley, of the Brady Institute, showing many striking pyeloureterograms of stricture in males, and Rathbun of the Brooklyn Hospital, whose urologic clinic is visited by about an equal number of men and women, assured me that, on recently reviewing his records over a period of several months, he found stricture diagnosed in more males than females.

*Symptoms and Diagnosis.*—Because this morbid condition has only recently been called to the attention of the profession, there is a natural tendency to skepticism concerning its existence and a feeling that it mainly concerns the specialist. If we pause to consider that it is one of the most frequent lesions in the abdominopelvic cavity, and that the symptoms due to ureteral stricture are daily causing more useless and fruitless operations on the abdominal and pelvic organs than are caused by diseases of any other viscus, we may well ask whether the subject is not one for the serious consideration of every physician.

Every general practitioner should be able from the anamnesis and physical examination to make at least a probable diagnosis of stricture. This is often as near as he can come to a diagnosis of chronic cholecystitis or chronic appendicitis, and no one would say that these

diseases are not within his province because he has to use special diagnostic methods or call in the surgeon to verify his diagnosis.

Ureteral stricture, because of its usual location in the pelvis in close proximity to various nerve plexuses, is likely to present not only its local inflammatory symptoms but various referred symptoms in the bladder, rectum, vagina, perineum, hip, and thigh. Because of its resultant urinary stasis we may have any variety of kidney discomfort, from a dull backache to the most excruciating renal colic; and not infrequently we see, as in other forms of kidney disturbance, marked gastrointestinal manifestations, such as indigestion, nausea, gaseous distention, and abdominal pain. Either the urinary stasis and absorption or the gastrointestinal condition, or a combination of both, may result in headache, at times of the severe migrainous type with the accompanying crises of nausea and vomiting; or the general picture may be that of uremia, associated with serious mental disturbances. In spite of the varied and complex symptoms that may arise from ureteral stricture the diagnosis, as a rule, is not difficult and should be made with a fair degree of certainty by the general practitioner. But, first of all, he should remember that the disease is not at all rare and that he should bear it in mind in his daily work, and consider its possible presence in any patient with vague or complicated abdominal or pelvic pains. It is the first possibility to be thought of in the case of any patient who has had from one to a dozen abdominal operations without relief of the original symptoms.

The chief aids in diagnosis are the presence of pain in the pelvic region, usually thought by women to be due to the ovaries or uterus, backache, and bladder symptoms. These symptoms are likely to be of intermittent occurrence, particularly in the early history of the disease, and in this early stage they are especially prone to occur as premenstrual or menstrual disturbances. Bladder symptoms occur in 70 per cent of the cases, and in 33 per cent form one of the chief complaints.

The urinalysis may be helpful, or, because of its normal or approximately normal character, it may be quite misleading. In 20 per cent of our ureteral stricture patients there is a pyelitis, an infected hydro-nephrosis, or a pyonephrosis, with a urinalysis calling one's attention at once to the urinary tract. In 50 per cent one finds only slight evidences of urinary tract disease, such as a trace of albumin, an occasional cast, an occasional leucocyte or erythrocyte. In the past these slight evidences of trouble have too often been ignored as being of no significance. In 30 per cent of patients with normal urine, the urinalysis has been the chief factor in preventing a correct diagnosis. The patients often give a history pointing strongly to some urinary tract lesion, but on the evidence of a normal urinalysis even the urologist too often refers these patients to some other branch of medicine for

diagnosis and treatment, while himself holding the only means for their relief.

Another distinct aid in the diagnosis by the general practitioner is the knowledge to be gained by palpation. In women the right kidney is usually, the left only occasionally, palpable. Ureteral stricture is usually bilateral, although the symptoms may be confined to one side only. Whether the kidney is palpable or not, one usually finds some degree of tenderness on bimanual palpation of the kidney region, or the patient will volunteer, "that is where I often have a soreness."

Usually both ureters are tender on palpation at their crossing of the pelvic brim, or at a point about one inch to one side of and one inch below the navel. This sign has led to countless futile appendicitis operations even when it was present over the left ureter alone. Finally, palpation of the diseased ureters near their entry to the bladder elicits much soreness or pain, reminding the patient of the previous pelvic discomforts, and causing a desire to void, especially if bladder symptoms have previously been present.

*End-Results.*—Recently a questionnaire was sent to my first 300 patients treated for ureteral stricture and the final request was that the patient classify herself under one of the following four conditions: (1) cured; (2) much improved; (3) improved; (4) not improved.

Taking the first one hundred answers, including patients to whom the treatments had been given from five to eight years previously, the classification resulted as follows:

Cured .....	29
Much improved .....	50
Improved .....	15
Not improved .....	6

Such results compare favorably with those obtained in most lines of medical or surgical treatment, and they are especially gratifying when one considers the character of patients dealt with. Many of them had been subjected to multiple operations and many belonged in the class usually considered as hopeless neurasthenics.

The failure to "cure" in some instances is probably due to morbidity left by operations; in some it may be due to the symptoms of a spinal or pelvic arthritis, a not uncommon complication in patients subject to focal infections. In some, the residual symptoms may be caused by a chronic cholecystitis, or appendicitis, or some slight pelvic lesion, the evidences of such chronic conditions not having been sufficient to warrant an exploratory operation.

The results are particularly satisfactory when one considers that in all probability they could not have been obtained from any other form of treatment.

*Pathologic Changes in the Kidney Due to Ureteral Stricture.*—Without having time to review the actual figures in the following groups of kidney lesions I should estimate that I have seen and treated approximately 400 cases of chronic and recurring pyelitis, associated with ureteral stricture in over 90 per cent; approximately the same number of hydronephrosis cases with an equally high percentage associated with stricture; approximately 200 cases of calculus with demonstrable stricture in over 90 per cent.

In a recent study (*Ureteral Stricture an Important Etiological Factor in the so-called Essential Hematurias*, Jour. Am. Med. Assn., 1922, lxxix, 1731) I reported on my last eighteen consecutive patients with essential hematuria in which there were found twenty-five bleeding kidneys, all associated with ureteral stricture. Since becoming interested in stricture I have seen approximately thirty patients with congenital malformation of the kidneys and ureters and the secondary conditions which prompted the patient to seek relief were associated, in all but one of them, with ureteral stricture.

Some patients who are being treated for a purely medical nephritis have in reality a nephritis associated with mechanical obstruction and can be made vastly more comfortable by being given good drainage through the dilatation of a ureteral stricture.

*Ureteral Stricture and Pregnancy.*—We now come to the main subject, namely, the part that ureteral stricture plays in those cases of multiple abortion and of premature delivery due to kidney defects, and in the more familiar cases of pyelitis during pregnancy and the puerperium. Of the first group I have a list of seventeen cases. The records in many of these were obtained some years after the abortions or premature births, the patient consulting me because of symptoms due to ureteral stricture. The criticism that I am assuming too much in presenting such records as those of cause and effect is accepted with humility, and I wish to state that I have not had enough experience with this group of cases to present anything of proved scientific value. The records in these cases are for the most part founded on such uncertain data as one obtains by getting the patient's history of abortions or premature births due to "kidney failure" and accompanied by such symptoms as oliguria, albuminuria, headaches and gastrointestinal symptoms, temporary blindness, edema, and "eclampsia, with convulsions." Syphilis as a factor has been excluded in most of these cases by the Wassermann test.

It is not necessary before such an audience to dwell on the nebulous state of our knowledge concerning the various toxemias of pregnancy. However, if future work demonstrates that some of those due to renal deficiency have as a background injury to the kidney caused by ureteral stricture we shall have made some progress in our diagnosis and therapeutics.

I wish to report briefly on three patients who seem to belong in this group and in whom the intervention by ureteral treatments certainly had a favorable influence on the general health, and apparently enabled them to carry subsequent pregnancies through to uneventful term.

Mrs. W., aged forty-five years, married at thirty-eight. For ten years she had suffered with indigestion. Three years before I saw her a full-term child had been born after a stormy pregnancy marked by uremic symptoms. The child was poorly nourished and died on the sixteenth day. Her physician said she had just escaped convulsions in labor and should never become pregnant again. Recently she had developed a feeling of "falling of the womb" and had a constant sore nagging spot low in the left pelvis, with severe dyspareunia. Her "indigestion" seemed to be exaggerated when the sore spot was worse. Bilateral stricture was found with a moderate hydronephrosis of 15 c.c. on the left side. After dilatation to a 6 mm. (18 Fr.) bulb her symptoms of indigestion, falling of the womb, and dyspareunia ceased, and her general health became better than for years. Seven months after beginning treatment she again became pregnant and was delivered at term of a large healthy boy.

Mrs. L., aged thirty-one years, was referred March 21, 1921, by Albert Singewald. Four years before she had had a premature delivery at seven months, the child living one year. At the fifth month of pregnancy it was found that she had a marked albuminuria. Whenever examined in the intervening four years, there was albuminuria. At my first consultation the patient was complaining of irregular bleeding of about four weeks' duration, pains in the ovarian regions, severe headache, and marked nervousness. She was found to be about two to three months pregnant and the urine contained one gram of albumin to the liter. She was found to have ureteral strictures which were so firm that the first wax bulbs of 3.6 mm. (11 Fr.), passed on either side, were molded back on the catheter because of the dense obstruction in going through the stricture areas.

When she returned for treatment two weeks later the albumin had lessened to half a gram per liter. After the second dilatation with a 4.3 mm. bulb (13 Fr.), the albumin again decreased by about one-half by the time of the third treatment two weeks later. A 5 mm. bulb (15 Fr.) was used on the third and fourth visits, after which the patient went on to term with no unusual symptoms, although a distinct trace of albumin persisted, and she had an occasional dull headache.

This patient was seen again in April, 1923. Her baby, born in August, 1921, was strong and well. Singewald had examined her urine from time to time, always finding some albumin. After an attack of grippe in December, 1922, the albumin had increased and in January, 1923, the systolic blood pressure was 225. It was 190 when I saw her in April. After two dilatations on either side the patient felt greatly improved and I have not seen her since, but Singewald reports that she is again extremely nervous and complains of headaches and backache. The patient has an old history of quinsy and her tonsils are manifestly diseased. It is quite likely that her strictures will continue to give trouble until the tonsils are removed.

Mrs. B., aged twenty-two years, a patient of Maurice Goldberg, Philadelphia, consulted me August 25, 1921, because of multiple abortions. She had been married two years, and six months after marriage had aborted a dead fetus, which the physician said was about six months of age. The second abortion was at three months and the third at six months. Her history was singularly devoid of complaints, persistent constipation and an occasional headache being the only deviations from good health. She had gained thirty pounds during her first pregnancy and

forty pounds with her second pregnancy, and now weighed 205 pounds. There was no complaint of pain and no history of bladder trouble. The teeth showed a number of extractions, gold caps and bridges, and a bad pyorrhea of the lower incisors. Blood pressure 135/84; Wassermann negative. There was tenderness over both ureters with a desire to void on pressure in the broad ligament regions. The urine was heavily loaded with pus and colon bacilli and showed a ring of albumin over one centimeter deep. The intramuscular phthalein test yielded, first hour 210 c.c., 20 per cent; second hour 410 c.c., 15 per cent. Renouretal investigation showed bilateral pyelitis, the left pelvis holding about 13 c.c. There was definite stricture on the left side about 2.5 cm. above the bladder, while the only infiltration demonstrated on the right side was in the bladder wall region.

After two dilatations on each side a bilateral functional test on September 30, 1921, showed after intravenous injection an appearance time of R., 4 minutes, L., 5 minutes. Amount in half an hour R., 65 c.c., 19 per cent, L., 30 c.c., 22 per cent. The patient returned November 2, 1921, when the uterus was apparently two to two and a half months pregnant. The third dilatation on each side was given in November and the fourth in January, 1922. The urine showed an improvement but there was still albumin, and each kidney yielded pus and a positive culture. In June, a 9-pound boy was delivered and I heard several months later that both mother and child were doing well.

Just recently, in writing the chapter on the Ureter for the second edition of Cabot's *Modern Urology* I estimated that "my cases of pyelitis of pregnancy and of the puerperium since beginning stricture work, number approximately thirty with perhaps twenty-five showing ureteral stricture."

On receiving the invitation to address this Society, I at once began a classification of my cases of pyelitis of pregnancy, and found that my records show thirty-five cases, with notes on the presence of ureteral stricture in all but one. The discrepancy between the actual records and the estimated figures for Cabot's *Urology* are to be explained as follows. During the accumulation of the records on these thirty-five cases I have seen probably five or six for whom I made no records. These patients have been seen in consultation with obstetricians, the acute pyelitis seemed to be running a normal course, and the advice has been to continue the usual line of expectant treatment for such cases. Presumably, such patients have gone through an acute pyelitis and I have not been called to see them again, and have therefore made no record. On the other hand those patients who continued to have pyelitis symptoms, or who later developed another attack of pyelitis, have been referred to me for active urologic treatment with the consequent recording of their histories. In such cases the presence of ureteral stricture has probably been the chief factor in the onset, persistence or recurrence of the pyelitis of pregnancy and accounts for the high percentage of stricture cases in my records.

I shall have to defer for future publication quite a few interesting facts to be developed from an analysis of the records associated with this group of thirty-five cases, including the after-history or end-results, in all those whose records we may be able to trace.

We have sufficient data from which to make a few important generalizations, which we are confident will be verified by the work of others in the future.

It is probable that the stricture in most of these cases is present before the incidence of pregnancy. A careful inquiry will at times elicit a definite history of previous stricture symptoms, such as pelvic pain or discomforts, backache, and intermittent bladder distress. As stated above, stricture may be present with absolutely no symptoms until some unusual event, such as a fresh focal infection, an unusual exposure or trauma, or the incidence of pregnancy, causes such changes in the previously dormant stricture area, as to result in the suddenly acquired pyelitis, or in stasis symptoms without the presence of urinary infection.

A pyelitis primarily due to stricture may clear up spontaneously even though the kidney and ureter are under the added burden associated with a pregnancy. Some patients with a pyelitis of pregnancy and in whose cases stricture is found, give a clear record of having had a pyelitis in a previous pregnancy and a symptomless period with normal urine in the interval. In such cases the stricture probably antedated the first attack of pyelitis. We see not a few nonpregnant cases with symptoms of a recently developing pyelitis, or of severe kidney involvement found to be associated with a hydronephrosis or a calculus, in which investigation shows the underlying factor to be ureteral stricture; and such patients give a history of not having had similar symptoms before, except during a pregnancy. One might argue that such illustrations mean that the former pyelitis of pregnancy had led to an ulceration of a local area in the ureter which later had resulted in the stricture leading to a subsequent attack, but a careful study of many hundreds of stricture patients does not favor such a view.

A tradition now being handed down in the literature is that patients who develop a pyelitis of pregnancy associated with a widely dilated pelvis and ureter show on the pyeloureterogram a prompt restoration to normal after delivery. I have not had sufficient experience with pyelitis of pregnancy unassociated with stricture to pass judgment on this view, but I am showing you a number of pyeloureterograms taken at intervals after pregnancy which thoroughly refute this tradition as applied to pyelitis of pregnancy cases associated with ureteral stricture.

In the very recent literature there have been shown pyeloureterograms in support of the traditional view, in some of which there is distinct evidence of the persistence of a considerable dilatation of the tract after delivery, although it may not be so marked as during the pregnancy. In some others the postpregnancy films show an irregular and indistinct outline of the pelvis and ureter, suggesting a dilated



condition which has not been pictured because of lack of filling by the shadowgraph material. The use of the bulb test would undoubtedly show stricture in most of these cases.

An interesting point of great practical value is that it is not always necessary to treat a pyelitis of pregnancy kidney until we get entirely rid of the infection.

If we dilate the stricture area at ten-day intervals until the patient has no further chills and fever, even following the trauma of dilatation, we may cease treatments and give the patient a fairly good prognosis for carrying through to term, even though the urine may still show an infection.

There has been much controversy in the past concerning the best drug for washing out the pelvis in chronic pyelitis. I find that the chief requisite is to establish good drainage, because in most cases the kidney will then promptly get rid of its infection without the aid of drugs by mouth or by direct renal lavage.

Herewith are presented a few of the more convincing pyeloureterograms together with brief case records to illustrate some of the above conclusions.

Fig. 1.—Mrs. M., aged twenty-eight years, first seen November 23, 1919 with John Bishop when her first child was one week old. Her temperature was 103.5° F. and the right flank was distended by an extremely sensitive mass considered to be an enlarged right kidney lying completely below the costal border. The patient gave a history of having had symptoms due to floating right kidney for six years, and this was the third very bad attack in that time. The urine showed albumin, casts, pus, blood and bacteria. This pyelitis attack subsided under medical, dietary and postural treatment. The patient came to my office four months later, when investigation showed a right kidney pelvis of 58 c.c. capacity and a decidedly purulent urine containing a colon bacillus infection. The wax-bulb showed two stricture areas in the lower ureter. Three dilatations were made in one month, carrying the stricture areas to 5 mm. In the next year the patient made a most satisfactory gain in general health but was still threatened with Dietl's crises after being on her feet overmuch. Capacity tests and pyeloureterogram showed a tendency to trapping of the fluid when the pelvis became full, and we decided to perform a nephropexy to overcome the secondary pathology resulting in stasis at the ureteropelvic region. This became imperative when the patient again became pregnant and we operated in the third month of pregnancy, doing a fixation of the kidney in a high position. In December, 1921, Karl Wilson reported that she went through her labor and puerperium without fever, the urine showing a slight increase in pus and albumin for a few days before delivery, and the patient complaining of slight soreness in the right kidney region for a day or two after.

The patient had trouble with domestics during her puerperium and was obliged to overdo physically and while investigation showed that the urine from the right kidney had completely cleared of its infection and pathologic elements since the kidney fixation, she developed such serious symptoms by the time her baby was four months old that I was obliged to operate again. The upper ureter had become densely bound to the posterior abdominal wall and to the enlarged pelvis in a manner to form a vicious angle with obstruction. A plastic operation was quite successful and the patient has remained symptom-free and has normal urine. She

has gained in weight from 126 to 141 pounds and says she is in better health than ever before. It was especially indicated that this kidney be saved because the left ureter was the seat of two strictures, and the left kidney, although symptom-free, had a two hour phthalein output of but 25 per cent.

Fig. 2.—Mrs. P., aged thirty years, was admitted to the Hebrew Hospital April 5, 1919, in the third month of her fifth pregnancy, complaining only of a marked hematuria of five days duration.



Fig. 1.

There was complete absence of pain, temperature of 101° F., and the urine was the color of black coffee.

On cystoscopy the urine from the left ureteral orifice was clear macroscopically, that from the right looked like dark blood. Stricture was found 2 cm. above the ureteral orifice, and the right kidney and ureter held 200 c.c. The urine from the right side contained much blood, a fairly large number of leucocytes, and culture developed a pure colon bacillus growth. The bleeding ceased after three dilata-

tions of the right ureteral stricture within a month. Three more dilatations within the next month carried the stricture up to a 5.6 mm. bulb. The pregnancy had then advanced to the sixth month, and she had an uneventful term delivery October 25, 1919.

This roentgenogram was taken two years later. Note the calculus opposite the fourth lumbar vertebra. It was displaced from the stricture area by the ingoing catheter. Note the 35 c.c. of NaBr settled in the lower ureter. The kidney and ureter held 70 c.c. and 35 c.c. of water had first been injected. This was apparently displaced upward by the heavier NaBr.

Fig. 3.—Left pyeloureterogram of same patient illustrated by Fig. 2.

This was taken February 8, 1922, over two years after the patient's delivery.



Fig. 2

This left side had been symptomless and it was investigated because the manifestly damaged right side had always yielded the higher phenolsulphonephthalein output. Pelvis and ureter held 60 c.c. Note the upper ureter displaced along the outer border of the psoas iliacus muscle and the sharp right angle turn in the ureter at about the pelvic brim region.

Fig. 4.—Bilateral stricture of the ureter, bilateral pyelitis of pregnancy and of the puerperium. Mrs. McC., aged thirty-one years, referred by L. F. Cosby of Abingdon, Va., in September, 1920. She had had four children, the youngest being four weeks old. There had been no trouble with her first three pregnancies. Throughout this last pregnancy she had not been well, being troubled chiefly with nausea, and for two months before the birth of her child she had had attacks of pain in the back and vomiting spells. After the birth of the child there was still much backache and there were severe attacks of pain situated chiefly under the

right shoulder blade with chills and fever, the temperature reaching from 103° to 104° F. At first these attacks were thought to be due to the gall bladder, but when pus and bacteria were found in the urine the diagnosis was changed to pyelitis. Investigation showed bilateral stricture with bilateral colon pyelitis. The right side held 55 c.c. and the left side 12 c.c. Five dilatations of each side, the bulb being carried up to 5.5 mm., resulted in complete clearing up of the leucocytes and in a negative culture with complete disappearance of the patient's symptoms. The patient was in the hospital five weeks, gaining ten pounds in weight, and eight weeks after returning home she wrote that she was feeling well in every way and had gained six pounds. The x-rays showed a marked abscess formation about several teeth and these were to be extracted after she returned home.

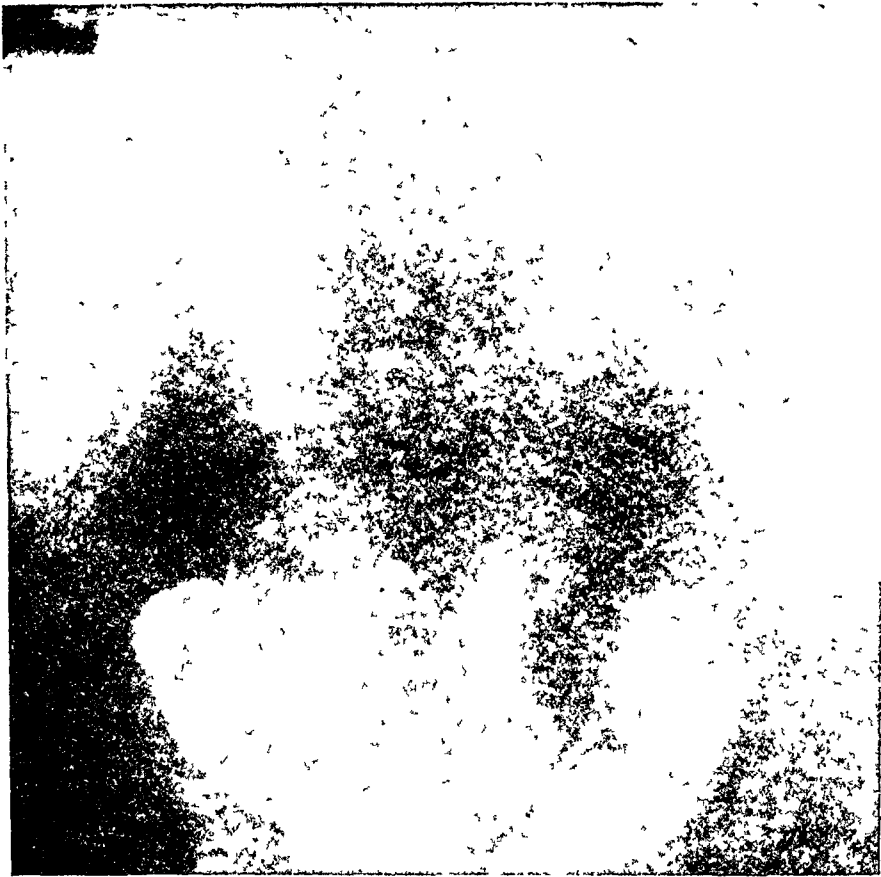


Fig. 3.

Fig. 5 illustrates same patient as Fig. 4. Note the strictured area in the iliac gland region. The wax bulb placed 10 cm. back of the catheter tip hangs at a point 8 cm. above the bladder and diags through a diffuse stricture area.

Fig. 6, showing left kidney and ureter holding 210 c.c. Ureteral stricture 15 mm. above the bladder opening. Mrs. K., aged 25, 2-para aged six and three years, entered the Hebrew Hospital in November, 1922, because of an acute lobar pneumonia. During her convalescence she developed an acute colon bacillus pyelitis on the left side, this being the first indication of urinary tract disease. Note the extreme dilatation of the ureter and of the calices with very little dilatation of the pelvis. Note the comparatively thick cortex of the lower pole. Three dilatations carrying the stricture area up to a 4.5 mm. (14 Fr.) bulb. Complete disappearance of the symptoms. Infection still present. See Fig. 7.

Fig. 7 represents same patient as Fig. 6. The patient returned August 17, 1923, stating that her last menstrual period was June 6. She was not complaining of symptoms and came to ask whether it would be safe for her to carry through a pregnancy. With her two former pregnancies she began vomiting as soon as she became pregnant. With this pregnancy she has had no vomiting and scarcely



Fig. 4.

any nausea. Color excellent, weight 155 lbs. Says that since her treatments eight months ago her menstrual periods, which previously always came too soon and were very painful, have been coming on time and without pain. Examination—uterus of apparently 2 months pregnancy size and consistency. Two-hour intramuscular phthalein, output 45 per cent. Bilateral ureteral stricture. On September 19, the left kidney and ureter were found to hold 160 c.c. The differential phthalein test, one hour, intravenous, showed left kidney 10 per cent, right kidney, (trans-vesical) 53 per cent. This pyelouretrogram of the right kidney shows a slight dilatation of 15 c.c. The ureter shows slight dilatation from the ureteral stricture

area, located 2 cm. above the bladder, throughout its length to the kidney. No infection on the right side. Colon bacillus infection still present on the left side. After two dilatations of each stricture area the pregnancy continued without unusual symptoms, and in March, 1924, the patient had a normal delivery of a child weighing over seven pounds.

Fig. 8.—Note the moderately dilated pelvis and the tortuous and much dilated right ureter. Mrs. S., aged twenty-eight years, 2-para, entered a hospital in April,



Fig. 5.

1922, with an acute attack of pain in the right side. She had never had pain or backache before. An investigation resulted in a diagnosis of right hydronephrosis and hydroureter due to ureteral stricture. A twenty-minute functional test after intravenous injection of phenolsulphonephthalein yielded 12 per cent from the right side and 22 per cent from the left. Both sides were negative for pus and on culture. With these data and without further attempt to relieve the patient by giving good ureteral drainage, a right nephrectomy was done.



Fig. 6.



Fig. 7.





FIG. 8.



Fig. 9.

Fig. 9, illustrates same patient as Fig. 8. The patient consulted me in April, 1923. She was five months pregnant and was beginning to complain of severe pain low in the left pelvis and in the left kidney region. Note the diffuse shadow of the large uterus, the vertebrae of the fetus on the left, the stricture area near the bladder with the slightly dilated ureter from this point to the kidney. The pelvis is no larger than one would expect in a kidney with compensatory hypertrophy. The shadow of the abdominal ureter is very faint, possibly due to the compression of the pregnant uterus. She had been advised to have a cesarean section and amputation of the tubes for sterilization. A two-hour phthalein test yielded 1025 c.c. of urine with color output of 65 per cent the first hour and 20 per cent the second hour. After three dilatations of the stricture area the patient was greatly improved, and she was then referred to Dr. Williams' obstetrical department where she had an uneventful delivery at term. From our knowledge gained in reading pyeloureterograms, we feel quite certain that the patient could have been restored to health by simple dilatations of her right ureteral stricture, and one could not ask for a better demonstration of the value of conserving both kidneys when possible.

2305 ST. PAUL STREET.

(For discussion see page 126.)

## TWO YEARS' EXPERIENCE WITH THE COMBINATION TREATMENT OF SURGERY AND RADIUM RAYS IN CASES OF CARCINOMA UTERI

BY GUSTAV SEELIGMANN, M.D., NEW YORK CITY

(From the Gynecological Service of the Lenox Hill Hospital)

IN 1920, I observed three cases of carcinoma, two of the collum uteri and one of the clitoris, which showed recurrences after six or more years. The two cases of carcinoma of the cervix belonged to a series of radical hysterectomies of the Freund-Wertheim type with isolation of the ureters, excision of the parametrial tissues and a large portion of the upper vagina. These results were so disappointing that I determined to combine rational surgical procedure with radium therapy in the attempt to improve the immediate and late results.

While x-ray therapy has been studied more extensively in Europe, the development of radium therapy has occurred chiefly in this country. The gamma-rays of radium have the power to destroy dividing and abnormal tissues in dosage that will not materially affect normal tissue cells. It is through this action that carcinoma cells are specifically destroyed.

It is to be regretted that several unfavorable factors have hindered the development of radium therapy in this country and its critical, conservative and scientific study. Among these factors are: (1) deficiency of the knowledge of the physics of the action of radium; (2) insufficient quantities of radium used by many investigators, results being reported after the use of as little as 100 mg. or even 50 mg.; (3) unreliable reports of poorly studied cases which even reached the lay press; (4) the prejudice of general surgeons whose reports

discourage radium treatment of carcinoma as a general subject without specification of type or location.

It is my opinion that carcinoma of the cervix should receive individual attention when considering the subject of radium therapy in the carcinoma field. These cases present themselves to the surgeon in an advanced stage, a high percentage even inoperable, due to the slight character of early symptoms and the tendency to early invasion of the parametria and the lymphatics. The radical operations are difficult and dangerous, the immediate mortality rate being very high and the late results unsatisfactory. The disparagement by the surgeon of

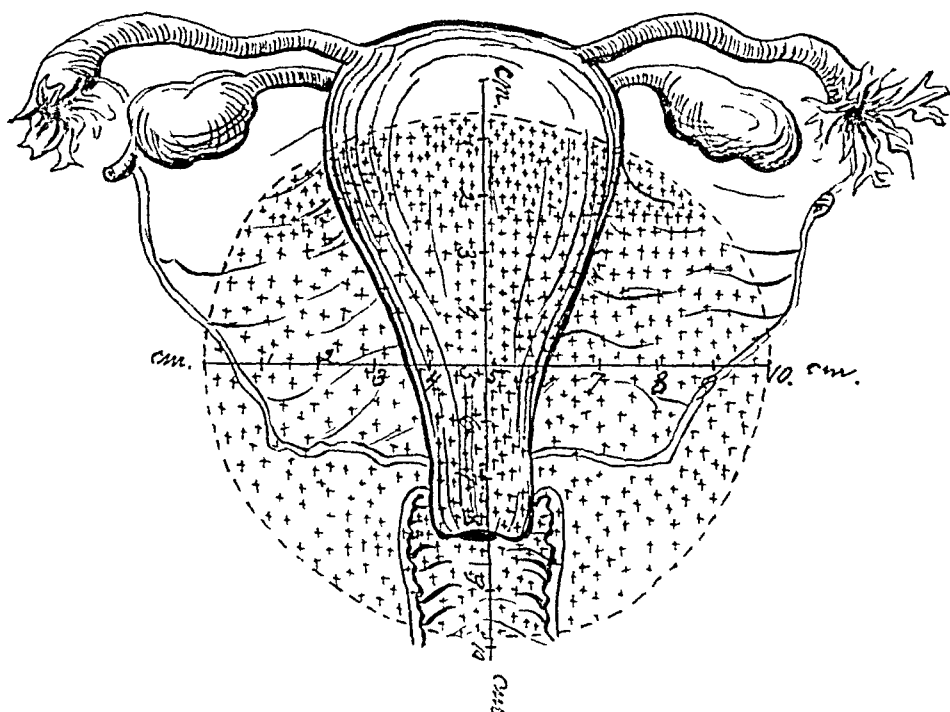


Fig. 1.

the use of radium therapy in cancer generally, should not be applied to carcinoma of the cervix until better operative and postoperative results can be obtained.

Between the end of 1921 and April, 1924, I have the records from my service in the Lenox Hill Hospital, of twenty-seven cases of malignant growths of the female genital organs, all of which received my personal care and treatment. It was clear to me from the beginning that the radium therapy should be applied by a specialist who had sufficient quantities of radium at his disposal, who was a physicist and mathematician and who had a proper knowledge of biology and pathology, to make it possible to discuss the many problems which would arise. This was done by Dr. I. Levin, Director of the New York City Cancer Institute and Chief of the Cancer Division of the

Montefiore Hospital in New York City. A careful study of a series of cases, even if comparatively small, must lead to a better, clearer and more reliable scientific result than the superficial and unreliable collective reports which we have had so far.

All cases were carefully studied before treatment was instituted. The following routine was observed:

1. Admission of patient to hospital.
2. Thorough history and general physical examination.
3. Special examination for metastases, especially in abdominal organs, skeletal x-ray pictures, etc.
4. Thorough gynecologic and rectal examination in conjunction with the radium therapist to determine plan of treatment. Cystoscopy and examination under narcosis if necessary.
5. Wassermann test, smears and blood counts.
6. Biopsy and pathologic examination of tumor tissue.

It is important to consider each case individually as each presents its own problem. After obtaining an exact idea of the shape, breadth, height, depth, direction and extent of the invasion of the tissues, the plan of procedure was determined; surgery, radium, x-ray, alone or in combination to obtain the best results.

As a matter of principle, I have ruled during the past two years, that cases which seemed to present a fair chance for removal of all of the diseased tissue should be considered operable and that the operation should be the primary procedure. For such cases I have abandoned the radical Freund-Wertheim operation and have done the typical panhysterectomy followed by this procedure: After the uterus, adnexa and upper vagina have been removed, the broad ligaments and the vagina are open. The radium therapist in sterile gown, gloves, etc., stands next to the operator holding a metal container in which is the radium substance or emanation, and to which is soldered a thick copper wire. The container is covered with a sterilized plastic material. This is placed into the area formerly occupied by the cervix and the intestines; the bladder and other organs are protected from the action of the rays by inserting a specially prepared eight layered gauze tampon ten yards long and six inches wide around the container. The abdominal incision is partially closed leaving an opening through which protrude the copper wire and the end of the tampon, and which is large enough to allow their subsequent removal. The patient returns to bed and the container remains in position for the time necessary to give the proper radium hour dosage after which it is removed by traction on the wire. The gauze is likewise removed and the opening in the abdominal wall is closed by tying silkworm gut stitches which were placed loosely in the wound at the operation. The wound heals by primary union.

If the conditions in a case are such that they do not permit the performance of this operative procedure, operation is performed with the purpose in view of applying radium emanation in the form of needles.

It is important in this connection to understand that the gamma ray will destroy carcinoma cells at a distance not greater than 3 to  $3\frac{1}{2}$  cm. This was demonstrated at the Berlin University in 1921. It is evident that treatment of carcinoma of the cervix with radium or its emanation will be ineffective if applied only to the vagina or cervix. An area with a 3 cm. radius from the external os as a center will not include the involved tissue. The region which is the object of therapy includes the upper vagina, the cervix (vaginal and supravaginal portions), lower uterine segment, the parametria and the iliac and hypogastric lymphatic nodes, an area with a diameter of ten cm. or more. The distance from a cauliflower-like growth to the base of the broad ligaments may be six to eight cm.

It was only logical therefore that in 1920 the radium therapists had begun to attack the involved area from above, i.e., through the abdominal cavity, as well as from below.

In this series of cases we have from the beginning established and maintained the principle of concentric attack. In the cases in which laparotomy was performed, the following technic was observed: Median longitudinal incision, protection of the intestines and bladder and free exposure of the uterus, adnexa and ligaments for examination. The patient was placed in exaggerated Trendelenburg position. The plan of treatment depended upon the topography of the case, the extent of the involved area, the location of involved lymphatic nodes and metastases, etc. The entire involved area was treated by inserting radium emanation needles in the form of minute capillary glass tubes. The dosage varied with the extent of the lesion, usually 4-9 mc. in 8-12 needles. The abdominal cavity was then closed by insertion of layer sutures without drainage. The needles remained permanently in the tissues. They cause no sequelae and in cases which were subsequently operated upon, were found encapsulated in the tissues. After abdominal closure, vaginal needling was done. The needles were inserted into the cervix, both from the vaginal surface and via the cervical canal, into the parametrial tissues and when necessary into the vaginal wall. In cases, when the patient's condition was poor, due to the effects of the laparotomy or cachexia, the vaginal needling was postponed for a few days. The vaginal dosage was about the same as the abdominal.

Other cases were first needled from the vagina and then after waiting six or more weeks, panhysterectomy was done.

Since the time of Cohnheim we have known that certain irritants such as heat, cold, chemicals, ultraviolet rays and x-rays are able to

produce changes in tissues which are characteristic of inflammation of an aseptic or noninfectious origin, namely diapedesis, migration of leucocytes through the walls of small blood vessels and formation of exudates. It is a fact of the greatest clinical importance that after the application of the gamma rays, a most violent reaction of this type occurs. This phenomenon requires more careful and extensive study. Clinically we have observed the following symptoms of a generalized body reaction. At times, high temperatures even 105° to 106° F. occur, of a remittent or continuous character with or without slight chills. Severe pain in the lower abdomen, continuous or spasmodic. Occasionally nausea and vomiting independent of the postoperative vomiting. In some cases decided prostration and syncope. The pulse usually corresponds to the temperature but we have observed small, rapid pulse when the temperature was not high. The duration of this reaction period also varies greatly, not always in proportion to the amount of radiation. We have seen very severe reaction in some cases after needling with comparatively small quantities through the vagina alone. On the other hand, in cases of extensive abdominal needling, we have seen some in which there was almost no reaction. This clinical picture reminds one of what the Germans call "Roentgen-Kater" and yet it is different. The blood is tested routinely before and after each radiation and shows almost regularly a hyperleucocytosis which is used as an indicator of the degree and duration of the reaction. The blood picture returns to normal but no further radiation is attempted until this occurs.

If, after the acute reaction has clinically ceased, the abdomen is opened for the hysterectomy, especially if done too early as in one case at six weeks after the intraabdominal needling,\* the following picture is seen. The parietal and visceral peritoneum of the entire minor pelvis is dark red. The peritoneum covering the uterus, broad ligaments and bladder are equally affected. The dark red peritoneum may be covered by a peculiar plastic exudate which is not purulent and which is bacteriologically sterile; a serous fluid, in places coagulated. After cutting the peritoneum, as in separating the bladder from the uterus, the subperitoneal tissue is found to be filled with bloody serum which wells out the moment the peritoneum is incised. The extraperitoneal tissues of the broad ligaments are similarly affected. In one case, S, No. 3 of my series, the uterus, adnexa, broad ligaments and intestines were matted together by plastic exudate as in cases of infectious peritonitis. The adhesions had to be separated by means of finger and scissors.

Vaginally the reaction to the rays is the production of a pro-

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\*After this case was operated upon, it became known that at least three months should elapse before hysterectomy.

nounced tissue necrosis in the carcinomatous tissue. A very profuse, foul-smelling, sero-purulent discharge occurs which soon diminishes and ceases after two to three weeks. A dark red, granulating cavity remains which, after ten to fourteen days shows marked contraction in size with the formation of new fibrous connective tissue. In cases which presented a large, inoperable, exuberant, cauliflower-like growth of the cervix, as much as possible of the tissue was removed by knife, scissors and large curette, before needling was done. Let me cite an instance of this character. Two years and three months ago, I operated upon a patient whose case presented a cavity the size of an apple, extending far up into the left parametrium due to extensive carcinomatous necrosis. During the curettage of this cavity, I momentarily expected to see the uterine artery spurt. After ray treatment as described above, the patient made an uneventful recovery. Upon recent examination I found a smooth crater-shaped cavity to the left of the cervix, into which I could just introduce the tip of my index finger. The patient is a laundress who works from morning to night, feels well, has slight discharge but no pain. I wish to state emphatically that I do not present this case as a cure but, in a patient from whom I would have expected death long ago, the palliative results are very remarkable.

I have attempted to describe briefly the technic of ray treatment and its clinical manifestations as practiced on my service at the Lennox Hill Hospital in this series of cases. The objects we have had in view are the following:

1. To employ the gamma-rays after hysterectomy in such manner that they can best exercise their cancer cell destroying power in reaching microscopically small nests of carcinoma cells. It is logical to believe that the percentage of recurrences will be reduced.
2. To make operable by the use of radium some cases that seemed inoperable before its use.
3. In inoperable cases, to attempt to destroy all living carcinoma cells by the method of concentric attack and at least to retard the progress of the diseases and ameliorate the symptoms.

The results achieved seem to justify the method of procedure. This paper was not written primarily for the purpose of reporting final results. It proves nothing to state the fact that my first cases that were radiated before or after hysterectomy are today without recurrence as the time of observation is too short. However, in eight cases we have seen but one recurrence and this not my own. It is interesting to state in this connection that a case of carcinoma of the uterus which was exposed to the rays immediately after operation in February, 1920, is also free from recurrence whereas two similar cases in



which the patients were operated upon at the same time, have in the meanwhile died from recurrences and metastases.

I have heard the criticism expressed by a prominent surgeon that the treatment of carcinoma by the use of local ray application was useless as the condition was only the localized manifestation of a general systemic disease. I do not care to discuss this conception of carcinoma except to state that among radium therapists the opinion is gradually gaining ground that the curative effect of radium is not only local but systemic.

Be this as it may, in our method we have utilized the gamma-ray as we previously used knife or cautery, to mechanically destroy the carcinoma tissue as far as possible and to a wider extent than is done by the generally used methods of application.

On account of generally good operative results, carcinoma of the body of the uterus has not been treated with this method but simple panhysterectomy has been done. Malignant ovarian tumors and other carcinomata of the genital organs have been treated in conjunction with Dr. I. Levin but are not considered in this article. These cases will be reported at some future time.

#### CONCLUSIONS

1. This paper is written with the intention of presenting to my colleagues our method of using the gamma-rays of radium and asking them to try the method and seriously study the results.

2. It is logical to expect improvement in final results by the combined method of surgery plus radium. Our results have been interesting and encouraging.

3. In inoperable cases, radium is the therapy of choice and gives results as measured by marked clinical improvement and in some instances inoperable cases have been made operable, so that it is no longer permissible to say to a patient with inoperable carcinoma of the cervix, "I can do nothing for you."

4. Carcinoma of the collum uteri is a field of research in radium therapy in many ways specific in presenting a problem different from carcinoma in other parts of the body.

35 EAST EIGHTY-FOURTH STREET.

# THE ELECTROCAUTERY IN THE TREATMENT OF LACERATIONS AND CHRONIC INFECTIOUS DISEASES OF THE CERVIX

BY HILLIARD E. MILLER, M.D., F.A.C.S., NEW ORLEANS, LA.

THE great majority of all women who have borne children have lacerations of the cervix, varying in degree from a slight nick to a tear which may extend up into the parametrium. Also a large number of nulliparous women have chronic infections of the cervix, varying from a slight leucorrhea to a persistent and profuse mucopurulent discharge. For this reason it is easy to understand why there is no structure of the body which has been the object of more surgical attention or whose treatment is more open to question. Amputation and trachelorrhaphy are the two standard procedures, but there are endless modifications of technic in each instance, and the question of when each operation shall be employed is still debatable ground for the reason that neither procedure even in the most skilled hands gives uniformly satisfactory results.

The origin of these conditions is easy to understand. In the multipara, where lacerations are in any way extensive, the resulting scar tissue interferes with the circulation in the tissues and drainage through the lymphatics, so that an almost chronic congestion results, which in turn predisposes to bacterial infection and inflammatory processes, often with marked cystic degeneration. These processes are responsible for nearly all leucorrheal discharges which do not arise from tubal disease or from pelvic exudates. Moreover, even mild lacerations, if the patient is examined eight or ten weeks after delivery, will show a surprisingly large percentage of eversions with erosions. Such conditions are, of course, nothing more than an outgrowth of columnar epithelium from the cervical canal, with a hyperplasia, which does not permit squamous cells from the outer side of the cervix to cover the raw areas. Chronic discharges follow and it is not infrequent, in examining such patients, to find the cervix bathed in a perfect puddle of mucopurulent material in the vault of the vagina. Such a condition, if not checked, results eventually in an inflammation or low grade infection of the endocervical glands, and because the lymphatic system of the cervix is continuous with that of the uterus and parametrium the infection may extend upward, with of course very much more serious results. In other cases the opening of the glands becomes sealed up and the mucoid material is

retained, thereby distending the gland to many times its natural size. This occluded mucus almost invariably becomes infected and therefore is a focus of infection to the entire blood stream. When these cystic changes do occur the circulation and lymphatic drainage is still further inhibited and there is still more eversion of the external os, until we sometimes find a cervix three or four times its natural size. We need merely to look at such a cervix, chronically inflamed and congested and pouring out a continuous mucopurulent discharge, to appreciate that it can easily be the source of a general systemic infection, quite as much as diseased teeth and tonsils. Indeed the condition is a good deal worse in looks at least than the average tonsil on which so much stress is laid.

In nulliparous women practically the same conditions are present except that the eversion is naturally limited by the fact that the cervix has not been torn. Many of these patients show a pathology which is undoubtedly the result of specific infections not recognized in childhood. In other instances, with constipation and general debility as predisposing factors, it is easy to see how the bacteria always present in the vagina may become active and give rise to an ascending infection. The endocervical glands become enlarged and are often chronically infected and distended with a mucoid or even a mucopurulent material, until the condition is just as much a source of distress and even ill health as in the lacerated multipara.

The standard operative treatment for these conditions in the multipara is either an amputation or a trachelorrhaphy. I have recently investigated a large series of such cases in private practice, which means that the patients were carefully selected and were operated on under the most favorable conditions, and I was astonished to find how large a percentage reported little or no relief from the operation. In every case the previous symptoms were about the same, a persistent and annoying leucorrhea for which no other pathology could be found, vague pelvic distress, nervousness, and frequently disturbed menstruation. In every instance the pathology was a laceration of varying degree, accompanied by erosion, eversion, often marked cystic degeneration, and practically always a profuse mucopurulent discharge. When amputation was the operation of choice less than 50 per cent of the patients were completely relieved. This operation was selected only in women near or past the menopause, 80 per cent of the group being over 40. In two instances it was done in patients of 35, but in each case there was an intractable discharge following a previous supravaginal amputation of the uterus in another service. The general opinion, which is substantiated by the results in our clinic, is that when amputation of the cervix is done in young women it almost invariably leads to disturbed menstruation, extreme nervousness and vague pelvic discomfort, particularly after

standing; also we have found that in these cases the uterus is rarely of normal size or tone. Conception does not seem to be influenced one way or the other, but premature delivery is rather frequent, and if full term labor does occur it is usually rather tedious and accompanied, at least in my own experience, by postpartum hemorrhage or unusually free bleeding.

In the series of trachelorrhaphies the results were very much better. Sixty per cent of the patients were completely relieved, and 30 per cent were partially or temporarily relieved, leaving only 10 per cent who stated that they had obtained no relief at all. It was interesting to note, too, that nearly a third of the patients relieved stated that since the operation their general health was better than it had ever been before, proving to my mind that a systemic infection had been eliminated. Although some two-thirds of these repair operations were done in women still in the child-bearing age the percentage of subsequent pregnancies was very small, less than 10 per cent. There is no actual organic reason for this, and the only way I can explain it is on the ground that the majority of these women had already borne several children and were probably using rigid contraceptive measures; indeed several voluntarily stated that this was the case. When pregnancy did follow, labor as a rule was somewhat prolonged, though not unduly, and in the majority of cases there was no fresh tear. The general effect of trachelorrhaphy on the whole is better than amputation; in the plastic operation the normal anatomic pelvic relations are less apt to be disturbed and the uterine body is protected against infection by a cervix of normal size and length.

In a third group of cases where the patient was a nullipara or where the tear was not extensive enough to demand a plastic operation simple cauterization was done, and in these cases the results were surprisingly good. From 85 to 90 per cent were completely relieved and in the majority of cases the patients stated that there was a marked improvement in their general health.

Careful analysis of these figures seems to prove that relief of the symptoms depends not so much on the repair operation or the amputation as on the clearing up of the infectious process in the endocervix. Where we have failed it is because we have not realized that the source of the discharge is the glands, which are either not entirely removed or not sufficiently cleared out. The old nonoperative methods tried to meet this condition and we all know how unsatisfactory they were, office treatment with silver nitrate applications, ichthyol and glycerine tampons, daily douches, rest in bed, possibly some uterine stimulant such as ergot. These were the women—minor gynecologic problems, if you will—who haunted our offices and eventually came to operation none the better but rather worse because our

temporizing measures had deferred radical treatment and allowed their condition to grow progressively worse. The repair work was eventually done in tissues congested, swollen, edematous and often chronically infected, so that faulty union resulted and the underlying glandular pathology was not corrected at all.

For the last several months I have been interested in treating such conditions in my office, particularly those following childbirth, with the electrocautery. At the routine examination about ten weeks after delivery there is often found a slight or moderate laceration with a mild degree of endocervicitis. I have already pointed out that if such a condition is allowed to persist it will lead ultimately to inflammatory changes with cystic degeneration and then to the whole vicious circle of distressing symptoms, and at last an operation with only partially satisfactory results. Recently in such cases I have been using a small electrocautery, similar to the one used by the nose and throat men, the degree of cauterization depending entirely on the degree of change which has already occurred. In the average case it means burning down the excessive granulations resulting from the eversion, which allows the squamous cells from the vaginal surface of the cervix to heal over the everted portion. If more than the average amount of trauma exists I make three or four linear incisions on both the everted anterior and posterior lips. This procedure is easily carried out after anesthetizing the affected area with a 4 per cent cocaine solution and inserting a small tampon of the same solution into the cervical canal for a few minutes, or it can be done without any anesthesia at all if the vaginal surface of the cervix can be avoided.

The patient is told to return in two weeks, at which time a similar treatment is usually given and she is discharged for six weeks. In the majority of cases at the end of this time the condition is practically normal except for the lacerations, which are not pathologic in themselves. The erosion has disappeared, the squamous epithelium from the vaginal surface of the cervix has spread over the everted areas, forming a smooth, glistening, healthy coat, and the discharge is practically gone. Subinvolution, which is associated with many of these conditions, is always markedly benefited. The condition is quite as healthy and the amount of scar tissue as little as could possibly be created by any type of plastic operation.

In some cases, naturally, too extensive a cauterization is necessary to permit of its being done at the office, in which case the patient is anesthetized at the hospital and the larger cautery used for a more extensive destruction of the glandular elements. If the tear extends up into the parametrium and is too extensive for simple cauterization to be effective, we have found that this treatment previous to the plastic operation puts the tissues in better condition for immediate

union with permanent results and reduces the chances of a chronic discharge by previously destroying the foci of infection.

There is much to be said in favor of the method. It is so simple and so free from after-effects that it is a reasonable office procedure. It spares the patient much inconvenience and suffering as well as the expense of a long hospital stay. It has markedly reduced the number of plastic operations we are performing and so far our results have been uniformly satisfactory. We are coming more and more to believe that in these conditions the best surgery is no surgery at all, and certainly we are laying less emphasis on the cases where operation once seemed inevitable. The method, of course, is not a new one; it was advocated many years ago by Hunner, and has been used in the operating room more or less ever since. With its application to office practice, however, I believe that we are in a fair way to relieve many more of our chronic cases with less inconvenience and expense to them and with more satisfaction to ourselves than was ever the case in the old days of local medications and extensive surgery.

I might say in conclusion that while radium is of distinct benefit in the treatment of chronic endocervicitis, its usefulness is limited strictly to cases in which it can be definitely determined that there is no latent infection of the tubes; unless this is kept constantly in mind very serious inflammations will promptly follow its use. The results are good in properly selected cases and with a carefully regulated dosage the menstrual cycle is not affected, but in no case are the results as prompt as with the electrocautery; hospitalization is always necessary, and the patient is subjected to more pain, inconvenience and expense than if she were treated by a simple cauterization such as I have described.

## CURETTAGE WITHOUT ANESTHESIA ON THE OFFICE TABLE\*

By HOWARD A. KELLY, M.D., BALTIMORE, MD.

THE rounds of our daily duties are an aggregation mostly of small things, while the big things, the dramatic episodes, are but occasional and relatively often of lesser importance. The elder Gross once said (and it had been said in well-rounded Latin phrase long before his time) to a lady apologizing for bothering him with her painful corns: "Madame, if I could but relieve all the corns in the world, I would consider my life well spent."

A big ovariectomy, that *pièce de resistance* of the surgeon of two generations ago, has become in our day almost a curiosity, so rare is it, but curettage to clean out the uterus and to establish a diagnosis is still with us like daily bread, and it is of this I wish to speak, simplifying, if I can, in some degree this commonest and safest of all our operations if, indeed, it justly deserves the name of operation at all. First, let me take a moment to justify its operative status as a sort of *mise en scène* for its technic which is to follow.

Curettage is just as definitely an operation as celiotomy, for it involves:

1. Surgical judgment as to its necessity.
2. Usually an anesthetic.
3. Use of sterile instruments of precision.
4. Dilatation of the cervical canal which is forcible and produces some rupture of fibers (occasionally extensive).
5. Use of the curette to remove the intrauterine tissues,—a bloody operation.
6. Sedulous care to avoid perforating the uterus.
7. Careful study of the tissues removed and an exact pathologic diagnosis.
8. Due respect to the after care of the patient.

That there are great, even lethal risks associated with unskilful work and sometimes even with skilful, the literature of the world abundantly proves. No man who has treated many patients has avoided perforating the fundus of the uterus with a sound, at some time or other.

In unskilful hands the uterus has even been bored through and placental forceps applied, the small intestine grasped and hauled out of the vagina and even (*mirabile dictu*), taken for some product of pregnancy, cut off and thrown into the bucket.

I have an as yet unpublished paper from Germany at present in my

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\*Read at a meeting of the Philadelphia Obstetrical Society, January 3, 1924.

hands showing that there are an enormous number of unskilful criminal abortions now being done in that country with disastrous results.

I insist therefore that in order to safeguard the patients and to brand the doctor and the midwife abortionist responsible for most of the serious accidents, as well as to impress the doctor who may be disposed to act without due comprehension of the risks, it is necessary to continue to dignify this procedure as a definite act in surgery.

I propose to simplify this time-honored procedure in several ways, fortified by my personal experiences for some years past. In doing this I suggest a technic for the specialist, which I condemn for the general practitioner lacking special skill and experience. Let it therefore be made plain that I speak only to gynecologists and of curettage for diagnostic purposes.

The usual bimanual examination has been made, determining the size, form, position and mobility of the uterus, as well as the absence of any lateral pelvic disease. A history of hemorrhages,—periodic, irregular or persistent, or of unusual discharges, calls for the examination by curettage of the interior of the uterus.

To follow custom and send the patient to the operating room to be curetted under an anesthetic involves delay until the next meal time has passed and demands the return of the surgeon at a specified hour with a further wait for the hardening and staining of the specimen for microscopic examination. If I think that the patient will trust me and can exercise moderate self-control, I tell her I want to do a small operation which will save her much time, and enable me to reach a prompt decision, and that she will experience three hurts, but that I will warn her each time so that she can grit her teeth for a moment and bear it; while all will be over in one or two minutes.

The instruments, sterilized, always ready for prompt use in these cases include a retracting speculum, Sims type, long dressing forceps and some cotton swabs to cleanse the vagina, narrow anterior wall retractor, bullet forceps, uterine sound, dilator, curette, salt mouth bottle with 10 per cent formalin, and a vaginal pack in case of free flow.

The patient lies in the dorsal position on the examining table on a pad with legs well flexed on the abdomen. The Sims speculum is introduced and the posterior vaginal wall retracted. The upper vagina is quickly swabbed out with one or two cotton pledgets saturated with alcohol, taking care not to touch the vulva. Now comes hurt number one; the anterior lip of the cervix is caught with the bullet forceps and the anterior wall retractor removed. The sound is introduced to ascertain the direction of the cervicouterine canal. Then comes hurt number two; the dilatation of the cervical canal. This is by no means the thorough dilatation we make under anesthesia. The object being



solely to open it enough to introduce a very small curette. The last hurt is the curettage, easily done, covering rapidly the whole interior of the uterus, which is explored with the sense of touch transferred to the end of the curette, recognizing any soft, boggy, yielding parts or distinguishing that firmer, gritty, normal base, so definite that we can often declare at once with approximate certainty that the uterus is normal. It is not necessary to secure much tissue for the microscope. If there is any disease, it separates easily and is ejected or flows from the cervix and is put in formalin and handed over to the laboratory for sectioning and staining.

I have for years found that I can make most of my diagnoses with a pocket lens magnifying ten or twelve times, holding the slide up to a good light, but the microscope, of course, follows for detailed study.

I have seen no accidents following this procedure; the work is done in my examining room in my hospital where a patient could be sent at once to a bed and detained, if necessary. I have made innumerable examinations of suspectedly healthy uteri, many of carcinoma of the body and intracervical, and occasionally find retained decidual products. If an intrauterine polyp is suspected, one must then use a small narrow-bladed polyp forceps and try to grasp it. I never try to examine a very nervous patient in this way; indeed, if the patient cries out, I desist and make an appointment for a later complete examination under anesthesia. Also some canals are so wide open that it is a matter of extreme simplicity to curette, even without the knowledge of the patient. I rarely curette a young, single, or nulliparous woman in this way. Curiously enough, patients have repeatedly requested me to omit an anesthetic. By this procedure I do miss the deeper, more complete examination of the lateral structures by the rectum, often so important as not to be passed over, but I save myself and suitable cases much time and carry my diagnoses through quickly, thereby sparing patients the fear, unpleasant anticipations, discomforts and added expense of a gas examination. Judiciously used, I believe this procedure will prove a boon to our specialists and I hope to them alone.

## A CASE OF TRUE HERMAPHRODISM\*

BY JAMES C. MASSON, M.D., ROCHESTER, MINNESOTA

*(From the Section on Surgery, Mayo Clinic.)*

CASES of true hermaphrodisism are exceedingly rare, and in the search of the literature I have not been able to find the report of a single case of true bilateral hermaphrodisism. There are a great many reports of cases of pseudohermaphrodisism. True hermaphrodisism

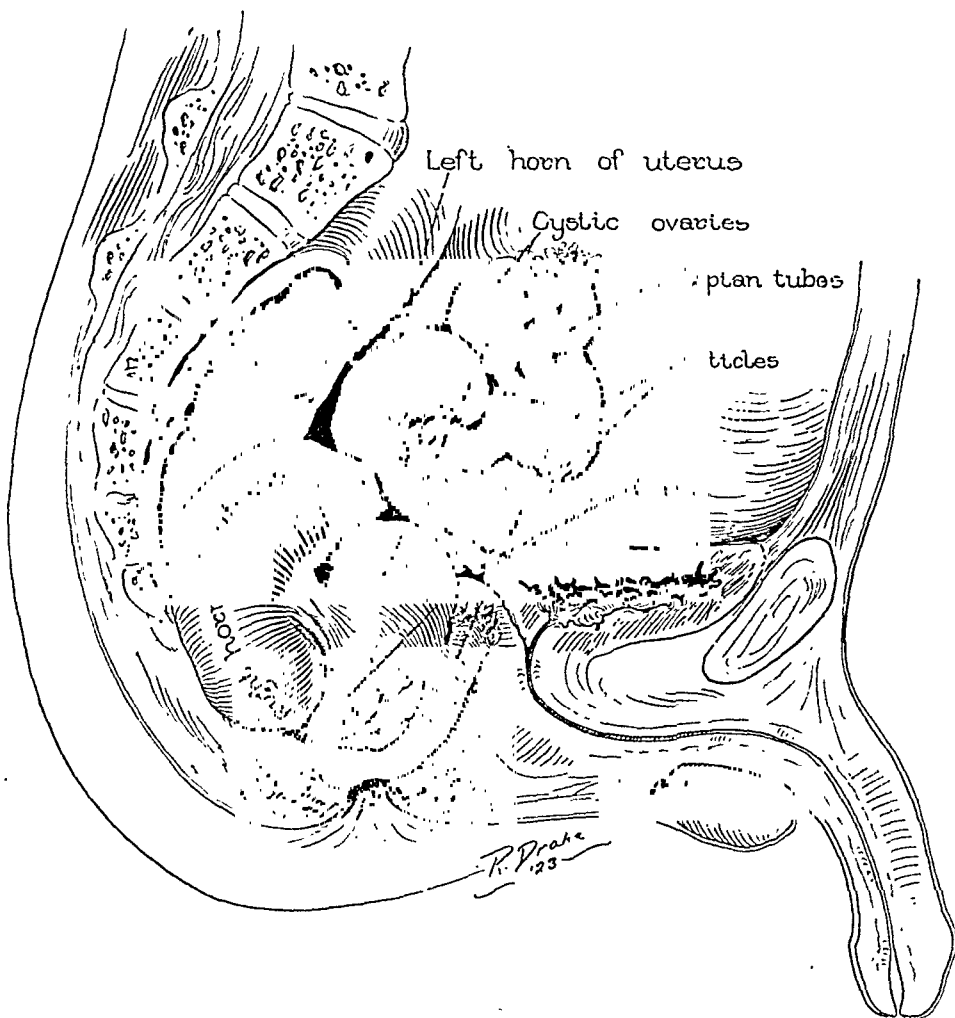


Fig. 1.—Diagrammatic anterior posterior section through the pelvis. True hermaphrodisism (Case A404073).

has been classified in three groups by Klebs: (1) unilateral, in which an ovary or testicle is on one side, and an ovary and testicle on the opposite side; (2) bilateral, in which there is an ovary and testicle on

\*Presented by invitation at the Forty-ninth Annual Meeting of the American Gynecological Society, Hot Springs, Va., May 15, 1924.

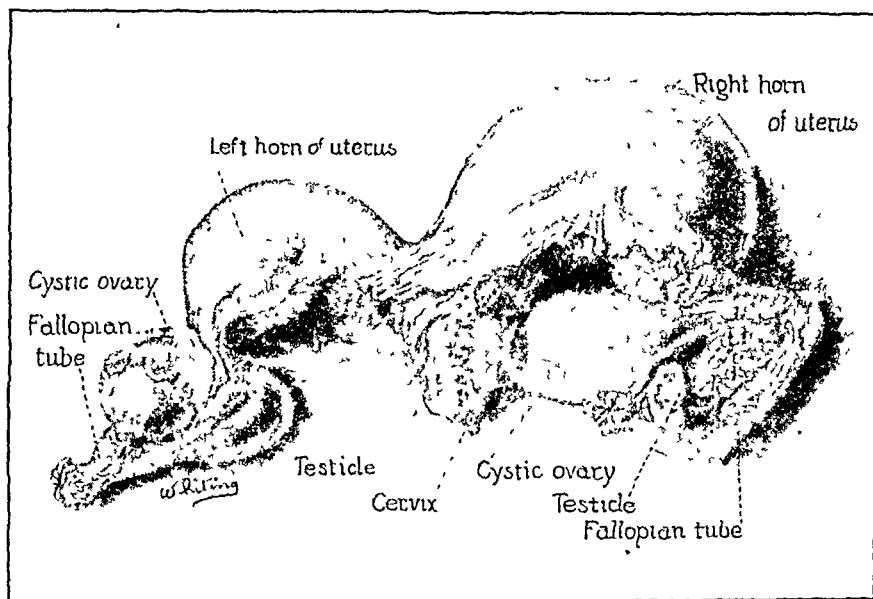


Fig. 2.—Specimen removed by operation showing the cervix attached to the urethra at the verumontanum, which was enlarged.



Fig. 3.—Section of uterus showing endometrium.

both sides, and (3) lateral, when there is an ovary on one side and testicle on the other.

The patient, F. V., aged forty years, apparently a male, came to the Mayo Clinic on account of recurrent attacks of lower abdominal pain associated with hematuria. He had been brought up as a boy, and his habits were distinctly masculine. He worked as a miner in Alberta and had served for five years in the British army during the war, as a driver of a motor truck. Spontaneous hemorrhage from the urethra had occurred at the age of thirty, and had recurred at fairly definite intervals of four or five weeks for ten years up to the time of his present examination. The bleeding was characteristic in that it appeared only during the act of micturition and was always terminal. The bladder would be emptied of clear normal urine, and in the effort to express the last few drops, a dram or two of pure red blood, followed by a varying amount of bloody mucus, would be expelled. The period of bleeding would continue for three or four days. The only associated symptoms at these times were a feeling of listlessness, and during the last four years, a severe stabbing pain in the left lower abdomen and groin, which would come on after the first appearance of blood and be repeated at frequent intervals during the next two or three days. The pain had recently become almost unbearable; it was never independent of the bleeding. Several examinations had been made, including cystoscopy, and the source of hematuria was believed to be a "spot" in the bladder, and possibly the left kidney.

The patient was slender, with the face of a rather mild-tempered man. He had scarcely any beard. His body resembled that of the female, with rather small shoulders, broad hips, transverse pubic hair-line, well-developed nipples, moderate-sized breasts which appeared to possess considerable gland structure, and absence of hair on the chest. No testicles could be felt in the scrotum. The penis was of normal shape and structure, but rather small. On careful palpation, there was demonstrable in the left renal area a mass, which apparently moved with respiration. No prostate or seminal vesicles could be felt by rectum, but an irregular shaped mass which was slightly movable could be felt in the pelvis.

The systolic blood pressure was 118, the diastolic 74, the pulse was 72, and the temperature 99. Urinalysis between spells was normal, save for a trace of albumin and a very few pus cells. The hemoglobin was 71 per cent, erythrocytes 4,200,000, leucocytes 5,400. The Wassermann reaction was negative. There was a combined phenolsulphonephthalein return of 40 per cent in one hour and fifteen minutes. The blood urea was 16 mg. for each 100 c.c. of blood. Roentgenograms of the kidneys, ureters, and bladder were negative. Cystoscopic examination between spells of hematuria revealed a normal bladder. No right ureteral meatus could be seen. The left ureteral meatus was normal and the secretion from the left kidney was clear. The left ureter was catheterized and was of normal length. The catheterized specimen from the left kidney contained a few red blood cells, believed to be due to trauma. On account of the diagnosis made elsewhere that blood was coming from the left kidney the patient was advised to remain under observation until bleeding should occur. Cystoscopic examination at the time of the bleeding ruled out the kidney and bladder as the source; the blood was thought to enter the urethra in the region of the verumontanum. A differential functional test, phenolsulphonephthalein as the indicator, showed 15 per cent return from the left kidney and 15 per cent from the bladder in fifteen minutes. Indigocarmin administered intravenously gave a dark blue color to the secretion from the left side. No blue could be seen on the right side.

In view of the history of periodicity, the admixture of mucus with the terminal hematuria, the female habitus, the well-developed breasts, feminine hair distribu-



Fig. 4.—Section of cervix showing nabothian glands.

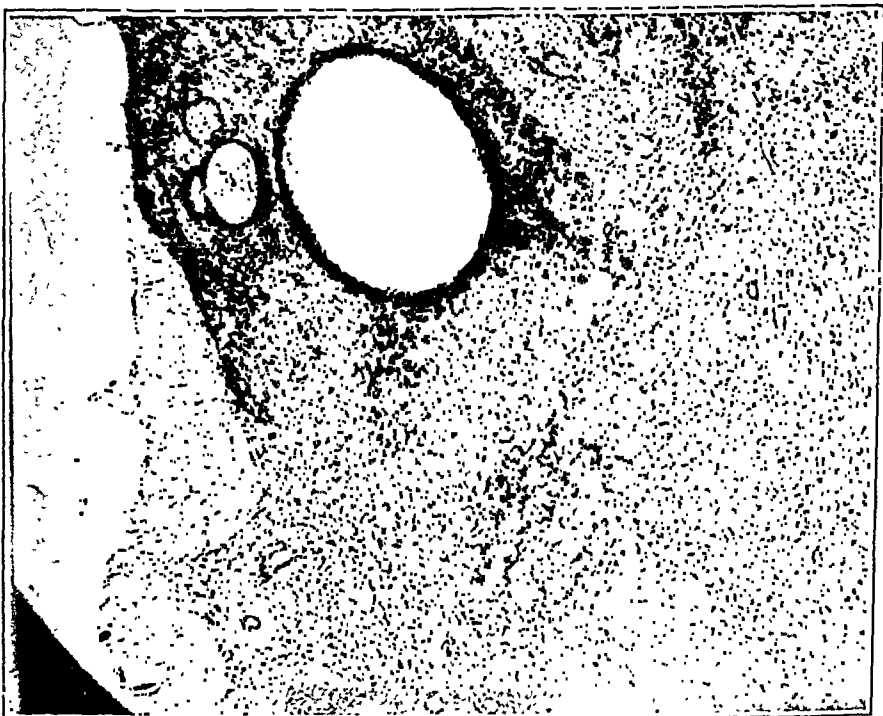


Fig. 5.—Section of ovary showing corpus albicans, with graafian follicles.



Fig. 6.—Section of fallopian tubes.

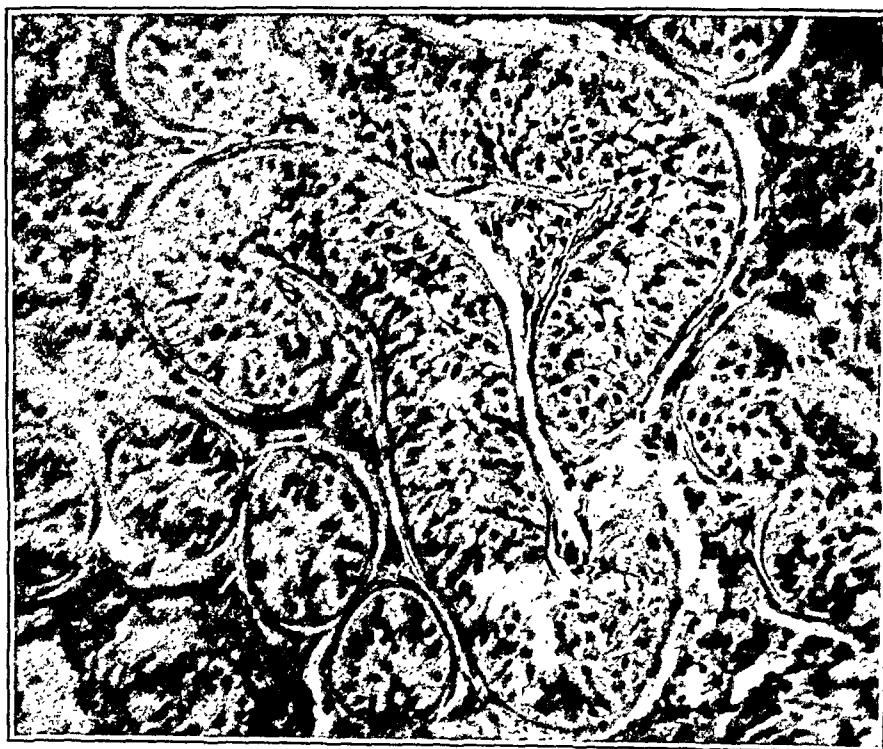


Fig. 7.—Section of testicle showing seminiferous tubules.

tion, apparent absence of prostate, small penis and empty scrotum, a diagnosis of congenital anomaly associated with the female generative organs was made and exploration advised.

At operation, October 11, 1922, a well-developed didelphic uterus, and bilateral tubes and ovaries were found. Both horns of the uterus were dilated with menstrual fluid, and were supported by well-defined round ligaments. It was difficult to determine whether or not a prostate was present. The broad ligaments contained small masses of tissue. The left kidney was markedly increased in size. There was no right kidney. A total abdominal hysterectomy was performed with the removal of both tubes and ovaries. The cervix opened into a small vaginal pouch which corresponded to the vagina masculinis and it was at this point evidently that the tract opened into the posterior urethra. At operation no testicular tissue was recognized, but the pathologist reported a bicornate uterus, a well-developed tube on the left, an incompletely developed tube on the right, normal bilateral ovaries containing cysts, and also considerable testicular tissue on each side with spermatozoa in the ducts (Figs. 1 to 7).

The patient was not told the details of the operation, but simply that a tumor causing the trouble had been removed. He had a normal postoperative course and was allowed to go home at the end of three weeks. Nine months later, he wrote that he felt well and had not had any more bleeding or pain, and was doing a man's work every day.

In handling cases of this type, I believe it is advisable not to confide in the patient too fully with regard to the operation. I had an unpleasant experience with a case of hermaphroditism or pseudohermaphroditism in which the external organs of both sexes were present. The patient had been brought up as a woman. I removed the testicles which were in the inguinal canal and a hypertrophied clitoris. This woman, a school teacher, had been apparently normal, although she knew there was some congenital anomaly. Before operation I explained to her what I would probably do, and she wanted it done, but for several months afterward she was much upset, and regretted that she had not elected to be made a man. She returned to see me once, and wrote several letters regarding the advisability of testicular gland transplants. I have kept her on ovarian extract, and she is apparently normal now, has distinctly feminine instincts, and is quite satisfied to be a woman. She has a small vagina, and I have consented to make a vagina by the Baldwin technic if she ever contemplates marriage. I believe she would have been saved much worry if I had not told her that she could have been a man.

## THE ELIMINATION OF ECLAMPSIA AS A COMPLICATION OF PREGNANCY

BY G. BROWN MILLER, M.D., F.A.C.S., WASHINGTON, D. C.

IT must be apparent to every careful observer that the responsibility of seeing a woman safely through her pregnancy is regarded too lightly by the majority of physicians who practice obstetrics. Nowhere is it more strikingly seen than in dealing with eclampsia and its preceding toxemia.

No woman *under the control* of an obstetrician should die of eclampsia. Should such a termination of preeclamptic toxemia ensue, it should be regarded as *prima facie* evidence of ignorance, negligence, or bad judgment on the part of the attending obstetrician. No excuse should be tolerated for negligence or ignorance. The position of the obstetrician who loses a case of eclampsia should be that of one convicted by circumstantial evidence and who can escape punishment only on the plea of bad judgment in the management of his case. Many cases will come under his care in which he cannot be held responsible; such as cases seen in consultation, those who disobey his instructions or those women who seek no medical advice until ill. My only fatalities in over 600 deliveries have been in this class of cases.

Eclampsia can be defined as the culmination of a toxemia occurring in the pregnant woman and usually accompanied by convulsions. Convulsions are not necessarily an accompaniment of the eclamptic state, as undoubted cases of eclampsia have occurred in which convulsions were absent, and on the other hand convulsions may occur in pregnancy, parturition, or the puerperium and be due to causes other than eclampsia.

Every obstetrician is familiar with the character of these convulsions. He is likewise familiar with the numerous theories concerning the etiology of the affection. These I will barely touch upon. The pathologic lesions found at autopsy upon women who have died of eclampsia have been carefully studied and seem to be quite characteristic of the malady. These lesions occur in the liver, and consist of thrombosis of the small blood vessels, hemorrhage into, and disintegration of, the liver substance at the periphery of the lobules. Changes also occur in the kidneys, brain, heart, etc. I will not go further into the pathologic features of the malady than to recall to your memory their extent by quoting a well-known book on obstetrics. "The lesions in the liver vary from congestion with fatty and granular



degeneration to necrosis with almost complete dissolution of the liver parenchyma \* \* \* .” The kidneys are swollen, the cortex thickened and pale, and the marking less distinct than normal. “\* \* \* The cells of the cortical tubules are swollen and in many places disintegrating. Other changes found are moderate fatty degeneration of the heart, and edema, congestion, and hemorrhages in the brain.”

It is to me almost inconceivable that these marked pathologic lesions found at autopsy could have been produced without a preceding toxemia, the evidence of which could have been discovered by the constant and careful observations of a competent obstetrician.

In the acute cases the toxemia may have been of short duration. The theory which seems to apply more nearly to the causation in these cases is that the toxemia is due to a placental infarct, which is frequently caused by, or causes separation of the placenta with hemorrhage between it and the uterine wall. I will not go further into this than to state that with frequent and careful examination the occurrence of such a hemorrhage if of considerable extent should be discovered. Hence it follows that in practically every case of eclampsia there must have been evidence of the preceding toxemia. It is probably nearer the truth to say in these acute cases that our vigilance had relaxed for a short time, that we had not seen our patient, had not examined the urine, nor taken the blood pressure for a week or more, that we had taken no note of uterine pains which might have been significant, that due regard had not been shown to headaches, digestive disturbances, etc., than to say as it is so often said “that the convulsions came on like a bolt out of the blue sky.” With a patient in a good hospital where she is under constant observation with daily urinary examinations and blood pressure findings, very few if any such cases would be recorded. In my own cases where one or more convulsions have occurred in women in whom evidences of the toxemia had escaped my observation the results have been uniformly good. The patients who die are the ones in whom the toxic signs and symptoms would not have escaped the observations of a competent obstetrician in touch with the patient.

My paper is intended as an appeal to those who undertake to carry a pregnant woman to a safe delivery to discover these signs of the preceding toxemia before serious damage has been done and to end the pregnancy when it is evident that this toxemia is not under control. Procrastination when danger signals persist in spite of diet, rest, eliminative treatment, etc., is as a rule unjustifiable. There is increasing evidence to show that the lesions in the kidneys, liver, heart and brain resulting from this toxemia, are, at times, permanent. It is quite logical to believe that a woman *who has nearly died of eclampsia must have changes in these organs comparable to a certain*

*similar lesions in another woman who actually dies of the disease.* If in the *latter* one finds at autopsy the extensive degenerations depicted by pathologists, there must be somewhat similar degenerations in these vital organs in the *former*. Certainly in some patients the albuminuria, the increased blood pressure, and other symptoms persist for months after the termination of the pregnancy. Practically all authors agree that the kidneys may be permanently damaged. Little or nothing is known as to the permanent damage to the liver and careful autopsy findings as to the condition of the liver in patients who have recovered from a serious attack of eclampsia and died of some other disease would be most instructive.

The signs and symptoms of preeclamptic toxemia are usually manifested in the last half of pregnancy but may make their appearance as early as the third month of gestation. Certainly it behooves the obstetrician to keep in touch with his patient from the time he is engaged, and to see her at least every two weeks in the early months, and weekly for the last three months of pregnancy. Should any symptoms of toxemia arise, of course, it may be advisable to see her every day or oftener. She should be instructed as to the symptoms of toxemia and told to report as soon as they manifest themselves.

The early signs and symptoms of the preceding toxemia are several and should be familiar to every one who does obstetrics. The chief ones are albuminuria, increased systolic blood pressure, edema of slight degree, headaches, slight jaundice, digestive disturbances, etc. The late symptoms such as albuminuric retinitis, edema of marked degree, violent epigastric pains, excruciating headaches, coma, etc., should not form a part of the picture of a case which is under the control of the obstetrician.

The toxemia affects the fetus as well as the mother and the effort to tide the toxic mother over several weeks until the fetus has reached full term or a viable age in order to save its life is usually futile. Cragin gave the fetal mortality in 251 cases of eclampsia occurring at the Sloane Maternity Hospital as 60.15 per cent. While this is probably higher than the average, it is certainly lower than the mortality where the toxemia occurs before the sixth month of gestation. He says truly "one of the problems facing the obstetrician in the toxemia of pregnancy is whether aside from the mother's interest, which usually should be paramount, the fetus has a better chance of life and development by remaining longer *in utero* or by being brought into the world. The risk of the fetus becoming more toxic or an accidental hemorrhage occurring at any time are so great that often the fetal chances are better from an interruption of pregnancy than from its longer continuance." I have seen several infants die in convulsions after being born of mothers suffering with preeclamptic toxemia. Is

it not more rational and better obstetrics in a case where there is an increasing or persisting albuminuria, increased and increasing systolic blood pressure, headaches, etc., in spite of conscientious efforts to control the toxemia, to end the pregnancy with every assurance that the woman will get entirely well, than to allow her to go into convulsions with the bad prognosis both to mother and child?

The maternal mortality in Cragin's 251 cases was 28.3 per cent. Williams estimated it at 20 to 25 per cent and the fetal mortality at about 50 per cent. Assuming that by the timely ending of the pregnancy there is no maternal mortality, then if there is a slightly increased fetal mortality (and this is doubtful) is not the saving of 28 out of every hundred mothers well worth while? I am so firmly convinced that this treatment is right, that with patients under my control I shall consider myself derelict in my duty if I ever have another death from eclampsia. It is much better for all concerned to end the pregnancy before the patient has been permanently crippled, let her get well and then have healthy babies than to run the risk of permanent invalidism, incapacity of bearing a healthy child, and a 28 per cent risk of dying. There is nothing original in this idea, but my experience and observation have so thoroughly convinced me that it is correct that I wish to emphasize it.

I shall cite briefly three illustrative cases:

CASE 1.—Mrs. R., primipara, twenty-six years old, came to Washington about the end of April, from another city with a letter to me from her physician who wrote that he had discovered albumin in the urine with increased systolic blood pressure in the sixth month of her pregnancy. She was due July 15. Examination of the patient showed a fairly heavy trace of albumin in the urine, a systolic blood pressure of 160. There was no edema, no headaches, no eye symptoms, but marked digestive disturbances. In spite of rest in bed, colonic irrigations, a diet consisting largely of milk, and catharsis, the albumin increased from  $\frac{1}{8}$  to  $\frac{1}{2}$  per cent. No casts were ever present and the urine though slightly acid showed on boiling evidences of albumin only after the addition of acetic acid. Her blood pressure increased to 200. She and her husband were very anxious to have a living child. I finally decided that it was too risky to allow the pregnancy to proceed further, so on June 8 she was sent to Columbia Hospital to have the pregnancy terminated. The same night labor came on and she was delivered of an infant weighing 3 pounds 9 ounces. It lived a few hours only. The albuminuria decreased slowly but was in evidence 8 months after labor; it finally disappeared. The increased systolic blood pressure subsided in about one month. She remained well, and has had since two healthy babies. She has shown no signs of toxemia since the first pregnancy.

CASE 2.—Mrs. O., a primipara, thirty-seven years old, was due to be delivered January 8, 1922. She came to me from the country in November, 1921. She had been told by her doctor that her urine was normal. On examination she proved to have a trace of albumin in the urine, her systolic blood pressure was 155, there was slight puffiness under the eyes and slight edema of the ankles. She entered Columbia Hospital, was put to bed, purged, given milk diet, but in spite of treatment she developed headaches, increasing systolic blood pressure

(197), increasing albuminuria and increasing edema. Spontaneous labor ended the pregnancy December 12 and she was delivered of a 4¾ pound child, which was placed under the care of a competent pediatrician. It did fairly well until allowed to nurse its mother at the end of 48 hours. It then developed convulsions and died in twelve hours. Under rest, purgations and diet the albumin decreased, the systolic blood pressure grew less but at the end of five weeks there was present a considerable trace of albumin and her blood pressure was 140. Her headaches persisted for several weeks. She has since given birth to a healthy child. I have not examined her since her delivery.

CASE 3.—Mrs. V. D., a primipara, twenty-six years old. She was due to be delivered June 25, 1924. Except that she had during March an attack of bronchitis followed by a persistent cough her condition was not disturbing until April 16. I had seen her one week before this visit when for the first time I discovered a very faint trace of albumin in the urine and a slight rise in her systolic blood pressure. She was put upon the usual treatment but in one week her condition was so alarming that she was sent to the Columbia Hospital for observation. Her blood pressure was 160; the urine showed a heavy trace of albumin and casts; there was nausea, diarrhea, headache, shortness of breath, etc. After 24 hours' observation her symptoms all grew worse and I induced labor. She gave birth to twins. These were premature and died within a few hours. My last examination of the patient was May 23 when the blood pressure was normal but the urine still contained a faint trace of albumin.

The first two cases show, I think, the usual type of preeclamptic toxemia. In both the toxemia manifested itself two to four months before labor was due. In one it had been discovered because the patient had been under the care of a competent obstetrician. In the other a careless observer had failed to discover the warning signs. In both, Nature ended the pregnancy before the development of convulsions. In both the albuminuria persisted several months after labor. One may be permanently crippled. In both in spite of painstaking efforts to save them the babies died. How much better it would have been to have ended the pregnancies before the toxemia had persisted for so long a time, and to have started the women on their child-bearing careers in a healthy condition. In the third case the development of the toxemia was so rapid that had I not seen the patient each week she could have had convulsions without my being aware that she was not well. This case illustrates most forcibly the necessity of frequent examinations in the latter months of pregnancy. The teaching that seeing the patient once in two weeks is sufficient will have to be radically changed.

To sum up briefly I believe:

1. That there are very few if any deaths from eclampsia without preceding signs and symptoms, which could have been discovered by constant and careful watching.

2. That it is imperative that the doctor who assumes the responsibility of an obstetrical case should see and examine his patient not,

less than once in two weeks in the early part, and weekly in the last two or three months, of pregnancy.

3. That it must be true that women with eclampsia who barely recover have lesions in the liver, kidneys, and perhaps the heart and brain which are permanent. These may or may not seriously affect the health of the patient subsequently.

4. That in cases of preeclamptic toxemia indicated by albuminuria, high systolic blood pressure, slight edema, headaches, and digestive disturbances, it is our duty to endeavor by rest in bed, milk, or markedly restricted diet, colonic irrigations, purgation, etc., to control the toxemia; and in case of failure to do this to promptly end the pregnancy. That to wait for albuminuric retinitis, marked edema, partial suppression of urine, is rashly jeopardizing the chances of living in the mother without correspondingly improving the prognosis for the child.

5. That it shall be my endeavor in the future to allow no patient under my control to come to that stage of toxemia which is now termed eclampsia.

1730 K. STREET, N. W.

## INTERSTITIAL PREGNANCY, WITH THE REPORT OF AN UNRUPTURED CASE\*

BY WALTER EDMOND LEVY, B.Sc., M.D., F.A.C.S., NEW ORLEANS, LA.

*Junior Associate in Obstetrics, Touro Infirmary; Instructor in Obstetrics, Tulane University.*

“**I**NTERSTITIAL pregnancy refers to the class of cases in which the ovum develops in that portion of the tube which passes through the wall of the uterus, or in a diverticulum from that part of the tube.” This definition, as given by Henrotin, taken in conjunction with this addition by Farrar, viz.: “Or in an accessory tube.” is, perhaps, the best anatomic description of the condition.

*Frequency.*—The most interesting feature of interstitial pregnancy is its relative infrequency, for next to ovarian, it is the rarest form of ectopic gestation. The series most often mentioned for statistical purposes is that of Rosenthal, who found that in 1324 ectopic pregnancies, the interstitial type occurred in 3 per cent. Munro-Kerr reports one case in a series of 80 ectopics, or 1.25 per cent. Wynne, from the Johns Hopkins clinic, reports only two that could be claimed as interstitial, out of a total of 304 ectopic pregnancies, or 0.65 per cent. In a total of 1547 collected cases of ectopic pregnancy, there are 18 cases of interstitial pregnancy, or 1.16 per cent. At Touro Infirmary, in a series of 45 cases of ectopic pregnancy operated on during the period from 1921-1923 inclusive, there are recorded two cases of the interstitial type, or 4.4 per cent.

*Etiology.*—Nearly all writers are agreed that previous inflammation is the predisposing cause of tubal pregnancy as well as of interstitial pregnancy. Mall, in a report based on 117 specimens of tubal pregnancy, collected over a period of seventeen years, laid great stress upon the inflammatory changes which must have preceded the lodgment of the ovum in the tube. Nevertheless, Farrar, in her résumé of the subject, does not believe that inflammatory changes play such an important part in causing interstitial pregnancies as in causing the true tubal type. She gives as additional causes mechanical obstructions, such as the uterine orifice of the tube being obstructed by a mucous polyp; a fibroma or a myoma in the wall of the tube itself; or an adenoma at the angle of the tube or at the junction of the tube and the uterine cavity. In addition she mentions congenital malformation, such as accessory tubes or diverticulae. I would also suggest, from the findings in my own case, that possibly infantilism of

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\*From the Department of Obstetrics, Touro Infirmary, New Orleans.

the female genitalia, with a very small lumen of the tube, can cause an arrest of the growing fertilized ovum in the interstitial portion. It was also brought out by Michinard that in most cases of tubal

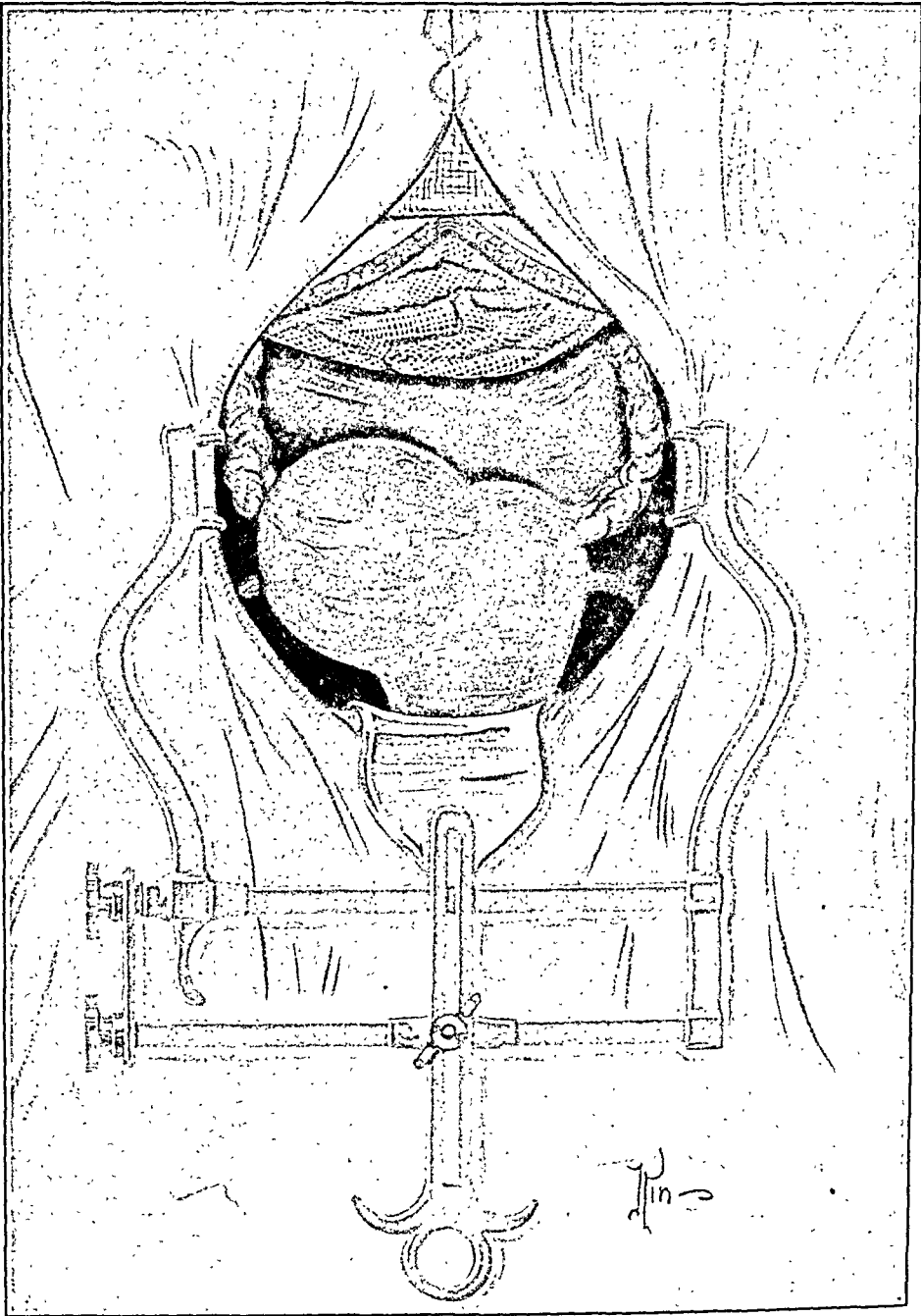


Fig. 1.—Semidiagrammatic, showing relationship of cornual pregnancy to the body of the uterus.

gestation the ovum is arrested some distance from the fimbriated end of the tube, and that as it requires some seven days for the impregnated ovum to travel through the oviduct, the ovum may overdevelop and wedge in a narrowed part of the tube.

*Course.*—That an interstitial pregnancy, as such, may go to term is greatly doubted by most authorities. It is perfectly reasonable, however, to suppose that, should an abortion into the uterine cavity, or a rupture and an abortion into the broad ligament or abdominal cavity, occur, that the pregnancy could go on to term as a uterine or abdominal pregnancy, as the case may be. However, cases of such a

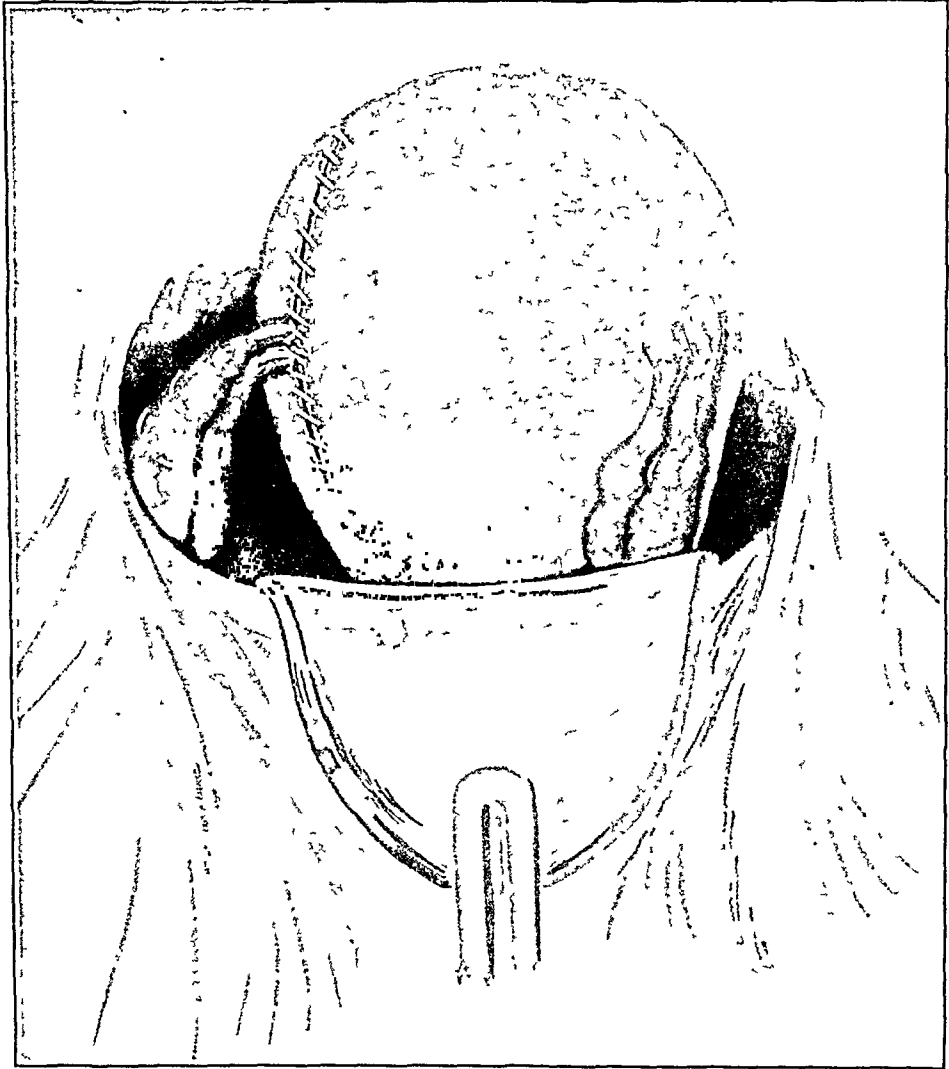


Fig. 2.—Semidiagrammatic, fixation of tube and round ligament to lateral wall of uterus, after resection of cornu.

nature, reported in the literature, are rather dubious and are not above criticism.

*Diagnosis.*—The diagnosis of interstitial pregnancy is very rarely made before rupture. Nevertheless, one is justified in suspecting this condition when the signs and symptoms of early pregnancy are supplemented by the usual symptoms of ectopic pregnancy. The pain is early and, as Schumann states, usually develops before bleeding or death of the ovum takes place, due to the fact that the uterine horn



does not easily stand distention. On vaginal examination, one finds a fairly regular enlargement of one cornu, sessile and merging with the outline of the uterus.

I wish to stress one point in regard to ectopic pregnancies in general, namely, that vaginal bleeding is no contraindication to a vaginal examination, and that one is never justified in making a diagnosis of a threatened abortion until the possibility of an extrauterine pregnancy is eliminated. Of the 26 cases of interstitial pregnancy reported since 1918, and including the present cases, vaginal bleeding occurred in seven, or 26.9 per cent. Graffagnino in a review of 186 cases of ectopic pregnancy admitted to the New Orleans Charity Hospital over a period of fourteen years, states that 60, or 32 per cent, complained of vaginal bleeding.

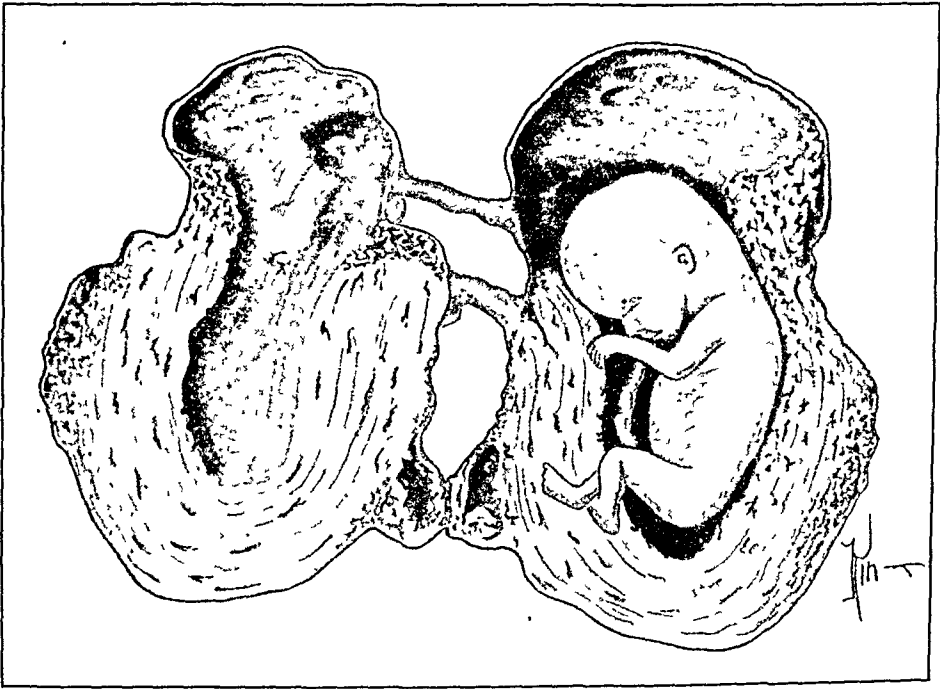


Fig. 3.—The resected tumor split longitudinally, showing the fetus *in situ* and the sac protruding.

*Prognosis.*—The prognosis in the interstitial type of ectopic gestation not operated upon before rupture is grave. When one considers the anatomy of this section of the uterus, one can readily see why it is easily possible for such a fearful hemorrhage to occur, as free bleeding comes from both the ovarian and uterine arteries. Wynne gives the mortality as 11.9 per cent, and cites four deaths in a series of 31 cases; Finsterer, two deaths in a series of 17 cases; Schink, four deaths in a series of 19 cases.

*Treatment.*—The treatment of interstitial pregnancy, whether ruptured or not, is always surgical. If diagnosed before rupture, immediate operation should be advised by the abdominal route. If the

pregnancy has not advanced too far, a resection of the affected cornu is the operation of choice.

When rupture has occurred, immediate laparotomy must be done, as the patient nearly always is *in extremis* due to the severe hemorrhage. In extreme cases, hysterectomy is the operation of choice and can be done with a greater degree of rapidity. In the less severe cases excision of the uterine cornu can be done. The postoperative treatment consists chiefly in combating shock, and where possible the giving of a transfusion.

#### CASES OF INTERSTITIAL PREGNANCY REPORTED SINCE 1918

Cope, V. Z. (*Proceedings Royal Society of Medicine*, 1920, Sec. *Obst. and Gynec.*, 13: pt. 3: 156-58.)

Age, forty years. History shows three previous miscarriages at 3½ months. Operation 36 hours after onset of acute pain. Left side. Supravaginal hysterectomy. Recovery.

Curtis, A. H. (*Surg. Gynec. and Obst.*, May 1918: 551-53.)

Age, twenty-seven years. Para ii; one miscarriage. Unruptured. Period of gestation not stated. Resection of right half of uterus and right tube. Recovery. No microscopic study.

Daniel, C. (*Surg. Gynec. and Obst.*, Jan. 1922; 15-21.)

Age, twenty-six years. Four normal pregnancies and three miscarriages. Gestation of about 2 months. Left side, unruptured. Supravaginal hysterectomy with ablation of adnexa under lumbar and spinal anesthesia. Recovery.

Age, forty-two years. Four full-term pregnancies, fifth pregnancy terminated in induced abortion at fifth month, followed by pelvic abscess. Sixth pregnancy at full term. History of gonorrheal infection. Ruptured. Abdominal hysterectomy leaving in both ovaries. Present pregnancy of about two months' duration, onset of pain, violent. Recovery.

DiPalma, S. (*Surg. Gynec. and Obst.*, Sept. 1921: 285-87.)

Age, twenty-nine years, para ii. Right fallopian tube removed for chronic salpingitis. Six months previous to admission curetted for three months' incomplete abortion. Ruptured five hours before admission. Left horn with tube removed. Recovery.

Age, thirty-two years, para vii. Several difficult labors, last pregnancy terminated in abortion at six weeks. Ruptured. Left salpingectomy, after diagnosis of tubointerstitial pregnancy. Death from sepsis.

Eckhard, Ph. (*Deutsch. med. Wchnschr.*, 1921: 996.)

Age, thirty-one years. Married two years, no pregnancies. About three months pregnant. Unruptured. Resection of right cornu. Recovery.

Falls, F. H. (*Surgical Clinics of Chicago*, June, 1920: 655.)

Age, twenty-eight years. Ruptured. First diagnosis, incomplete septic abortion. Subtotal hysterectomy. Recovery.

Gilbert, T. C. (*Texas State Jour. Med.*, 18: 546-47. 1923.)

Age, twenty-six years, one pregnancy. Ruptured into abdominal and uterine cavity and aborted a fetus of four months. Supravaginal hysterectomy. Death.

Heekes, J. W. (*Brit. Med Jour.*, 1922, 2: 309.)

Age, twenty-nine years. Two and one-half months pregnant. Left side involved. Rupture in incipency. Supravaginal hysterectomy. Recovery.

Kennard, K. S., and others (*AM. JOUR. OBST. AND GYN.*, 2: 642-44. 1921.)

Age, thirty-eight years. No pregnancy during first seven years of marriage. One pregnancy two years after operation for retroflexion. Diagnosis of ruptured uterus. Fetus of three months size found in peritoneal opening. Suture of uterus. Tube drain left in. Death. Complete autopsy report showing condition to have been left cornual pregnancy.

MacIntyre, Donald, (*Journ. of Obst. and Gyn. of the Brit. Emp.*, 29: 314-19. 1922.)

Age, twenty-three years. Followed salpingoophorectomy of same side (right). One normal child 18 months after operation mentioned above. Present pregnancy ruptured. Resection of right cornu.

Martius, (*Arch. f. Gyn.*, 120: 320-22. 1923.)

Age, thirty-one years. Para vi. Unruptured, seven months pregnancy of four years' duration with normal pregnancy in the meantime. Left side. Supravaginal hysterectomy. Recovery.



Fig. 4.—Microphotograph (X90) showing uterine musculature, uterine glands and decidua.

Moore, G. A. (*Boston Med. and Surg. Jour.*, 187: 284-88. 1922.)

Age, twenty-seven years. One child. Present pregnancy involves left side. Operation before rupture; excision of tumor including left tube. Recovery.

Pfaff, O. G. (*Am. Jour. of Obst.*, 79: 106-08. 1919.)

Age, not stated. Ruptured at eight weeks, two weeks previous to operation. Suture of uterine wall. Rubber tube drain through culdesac into vagina. Recovery.

Rose, B. T. (*Lancet*, 1919, 1: 175.)

Age, thirty years. Incomplete abortion 18 months previous. Ruptured. Pregnancy of right cornu. Resection of right part of uterus with right tube and ovary.

Turenne, A. (*Revista med. del Uruguay*, 23: 290. 1920.)

Age, forty-one years. Para iii, deliveries normal, children all abnormal. Present pregnancy at 3½ months unruptured. Left side involved. Doubtful case. Excision of mass.

Age, twenty years. Para iii; about three months pregnant. Right cornu. Operation not stated; pregnancy progressing normally four months after operation.

Age, not stated. Para iii. Four months pregnant. Left cornu. Pregnancy proceeded to term. Doubtful case.

(Cases of Turenne not described in detail.)

Vaudescat, Robert. *Contribution a l'etude de la grossesse interstitielle*. 1919.

Age, thirty-five years. Pregnancy of four months. No other pregnancies, no miscarriages. Tumor on left side. Rupture during operation. Hysterectomy. Recovery.

Age, thirty years. Pregnant about one month. Sudden cessation of last menses and further hemorrhage after a few days but without pain. Condition involves right side. Abdominal hysterectomy, subtotal. Tumor unruptured.

Age, twenty-three years. One normal pregnancy, followed by slight leucorrhea until present time. Pregnancy about one month's duration. Hemorrhage of about one month. Left side involved. Resection of uterus. Recovery. Tumor ruptured.

Willette, (*Ann. de Gyn. et Obst.*, 13: 656-57. 1919.)

No age stated. Case ruptured. Suture of uterus. Recovery.

Woolf, A. E. (*Lancet*, 1922, 1: 11-12.)

No age stated. One child, no miscarriages. No pregnancies for past seven years.

Tumor, bilateral, ruptured. Subtotal hysterectomy.

Wormser, E. (*Schweiz. med. Wchnschr.* 51: 343. 1921.)

Age, thirty-eight years. Para iii, last in 1913. Ovarian cyst removed from left side in 1917. Present pregnancy of three and one-half months' duration. Ruptured. Supravaginal hysterectomy.

#### REPORT OF PERSONAL CASE

Case No. B. 2259 (Touro Infirmary). Mrs. F. P. G., white; age twenty-seven years; married about five months. Complaint: Pain in the abdomen; vaginal bleeding. Present illness began April 16, 1924, as a pain in the lower part of the abdomen, more intense on the right side, Pain was cramplike in character and was described as "bearing-down pain." She had missed her period which was due on Feb. 9, 1924. Ten days later she menstruated for one day only, and with some pain. Every three or four days following this she would lose for a day at a time. After the onset of the severe pains mentioned above, she began to lose every day. Was nauseated and vomited several days before the onset of the pain. Pain not severe enough to cause the patient to faint.

Appendectomy in December, 1921.

*Physical examination:* Fairly well developed and fairly well nourished, white female. Short of stature, weight, 93 pounds. Skin, warm, dry and elastic. Tenderness present over the lower part of the abdomen, particularly on the right side.

*Menstrual history:* Began at the age of twelve years. Regular, every 28 days, lasting 3 to 4 days. Considerable pain for first day. Passed clots as a rule.

*Vaginal examination:* Marital vagina. Mucous membrane of purple color. No evidence of infection of Bartholin's or Skene's glands. Slight amount of blood in vagina. Cervix soft, not dilated. Uterus soft, not markedly enlarged. Continuous with fundus of the uterus on the right side is an ovoid mass about the size of a small orange. Sessile, not pedunculated. Tubes and ovaries negative.

*Diagnosis:* Unruptured interstitial pregnancy (right side).

*Operation:* April 21, 1924. Ethylene, preceded by morphia gr. 1/6; atropine gr. 1/150. Skin was prepared with benzine-iodine and iodine. Abdomen entered through a midline incision between umbilicus and symphysis pubis. Usual protection of skin edges and walling off of general cavity. The uterus was smaller than the time of pregnancy calculated from the menstrual history would indicate. The right cornu of the uterus was ballooned out to about the size of a small orange. (Fig. 1.) The mass was of a purple color. The round ligament was inferior to and in front of the mass. The tube and ovary on this side were normal. The mass was resected without rupture. (Figs. 2, 3, and 4.) The wound in the uterus was closed with a double line of No. 2 chromic sutures. The right tube and ovary were left in. The appendix had been removed at a previous operation. Abdomen closed in tiers:—No. 2 chromic for peritoneum and fascia; silk-worm and Michel clips for the skin. Discharged from hospital on May 2. On May 15, 1924, patient was feeling well; able to be up and about. No abdominal tenderness. Uterus in good position, freely moveable; no pain or tenderness in right fornix.

*Pathologic Report* by Dr. John A. Lanford. Gross: The specimen is an irregularly oval mass measuring  $6\frac{1}{2}$  cm. in length,  $5\frac{1}{2}$  cm. at its widest portion and  $4\frac{1}{2}$  cm. in thickness. Its outer surface is for the most part a bright reddish pink color, one half of which is covered with serous membrane, being smooth and free from adhesions. The other half presents a freshly cut surface which is contracted around an opening through which projects a fluctuating mass, bright red in color. On the inferior border at the junction of the freshly cut surface with the smooth serous membrane, is the remnant of the fallopian tube. On sectioning the mass, it is found to be a portion of the uterus in which is located a fetus and placenta within its membranes. The fetus measures  $3\frac{1}{2}$  cm. in length. The cavity of the cornual portion of the uterus is filled up with placental tissue. The mucosa is thickened, deeply congested, but intact. The walls of the cornual portion of the uterus are increased in thickness and hypertrophied, but show no increased amount of blood.

*Microscopic:* The microscopic study of the sections from the uterine wall show hypertrophy of the muscularis together with edema and congestion of the blood vessels. The mucosa is thickened, presenting the hypertrophy associated with pregnancy and its upper surface is converted into decidua. The attached portion of the placenta presents a normal picture. The sections through the attached portion of the fallopian tube show hypertrophy of the wall, flattening out of the mucous processes and increased congestion. No decidual cell formation is found.

### *Choice of Operation in Cases Reported 1918-24*

Resection .....	5	Suture .....	3
Hysterectomy, complete or		Resection with adnexa.....	4
supravaginal .....	11		

Table includes only 23 of total of 26 cases, from lack of information on remaining three.

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Note: My thanks are due to Miss Mary Louise Marshall, Assistant in Charge of the Orleans Parish Medical Society Library, for assistance in abstracting, and preparing the bibliography.

# A METHOD FOR THE ASPIRATION OF MUCUS IN ASPHYXIA NEONATORUM

BY LOUIS A. BUNIM, M.D., WASHINGTON, D.C.

(From the Obstetrical Service, Columbia Hospital for Women)

**I**N the removal of mucus from the infant's trachea the desirable thing is to clear the trachea without aspirating the very tenacious material into one's mouth.

Very often we find great difficulty in avoiding this unpleasant experience, when an ordinary catheter is employed.

I have devised this new aspirator which, so far as I know, has not been previously described.

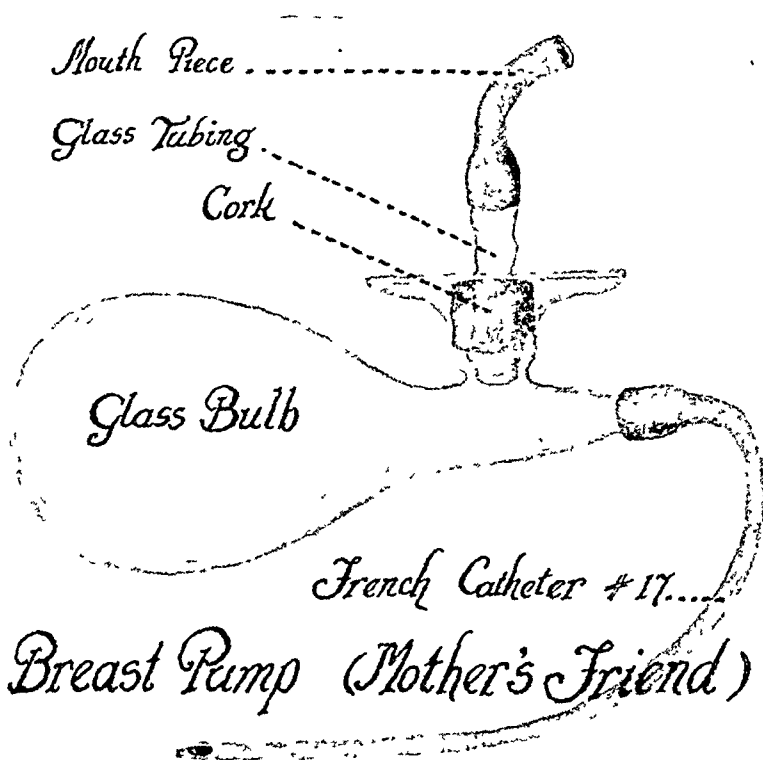


Fig. 1.

It can be readily constructed from a breast pump on the market under the name "Mother's Friend."

The catheter is that of an ordinary No. 17 French. The tip is placed at the level of the epiglottis and suction made at the mouth-piece, the force of which should not exceed that used in smoking a pipe, will cause the mucus to accumulate in the bulb, and produce the desired effect.

## REPORT OF A CASE OF TABES DORSALIS COMPLICATING PREGNANCY

BY ROBERT N. HAMBLEN, M.D., SPOKANE, WASH.

Mrs. J. E., aged forty-one, primipara, was referred to me in the sixth month of her pregnancy.

*Family History.*—Mother died of aneurysm of the aorta at sixty-eight years. Patient's former husband was in poor health and had pleurisy at one time, but no history of lues. Present husband is in good health. Father, two brothers and two sisters are living and well.

*Personal History.*—Patient had measles and whooping cough and several attacks of grip, and was supposed to have had tuberculosis of the ankle twenty years ago. Tonsillectomy six years ago. Puberty at eleven years. Menses every twenty-one days, for three days, and formerly painful. Was married the first time fifteen years ago but was never pregnant by her first husband. Second marriage three years ago, followed by one abortion at two and one-half months which was supposed to have been caused by an automobile trip. This abortion was followed by a curettement.

*Present Condition.*—First day of last menstruation was March 31, 1923. Quickening occurred August 15, slight nausea and vomiting during the first three months of pregnancy. During July and August patient had three attacks of sudden severe abdominal pain radiating around the chest to the back, but not to the shoulder or scapula and not followed by jaundice. In some of these attacks the pain lasted as long as four hours and was accompanied by sweating and vomiting.

The findings on examination by Drs. F. Epplen and G. E. Price on August 22 were briefly as follow:—

Eyes: pupils unequal, right larger, irregular in outline and sluggish in reaction to light, left pupil normal. Gait normal. Romberg sign present but not marked. Knee jerks absent. Positive Gordon, Oppenheim and Chaddock signs, latter on left side only. Normal plantar reflex on both sides. Abdominal reflex present on left side, absent on right. Heart and lungs normal. Abdomen corresponds in size to about six months' pregnancy. Urine normal. Blood cell count and Hb. within normal. Blood Wassermann test negative. Spinal fluid shows twelve cells per cmm. and Wassermann test 3+. Diagnosis was made of tabes dorsalis, the attacks of abdominal pain being considered gastric crises, and accordingly antiluetic treatment was instituted. Seven intravenous injections of 0.6 gr. salvarsan were given intravenously between August 24 and October 8, with only one attack of abdominal pain occurring during this time.

Pregnancy was uneventful from this point on, labor occurring January 21. The total length of labor was about forty-eight hours; during the first stage the pains were irregular and ineffective. The position was L. O. P., converted into R. O. A. by Pomeroy's method of suprapelvic rotation when the cervix was sufficiently dilated to permit passage of the operator's hand. Labor was then permitted to continue for about six hours when low mid-plane forceps were applied and delivery easily accomplished. The baby weighed 8 pounds 11½ oz., cried spontaneously and appeared normal in every way, showing no clinical evidence of syphilis. Labor not considered more difficult or prolonged than would be expected in a forty-one year old primipara with a posterior position. The patient had two attacks of abdominal pain during her puerperium, which were considered gastric crises, but

otherwise her two weeks stay in the hospital was uneventful. She was last seen May 7, and reported that she was having attacks of abdominal pain about once a month, but would not follow advice and resume treatment.

This case was of special interest from an obstetrical point of view because of the rarity of such cases and the uncertainty of the effect that a tabetic lesion would have upon the onset and progress of labor and contraction of the uterus postpartum. I have been unable to find any report in the literature of a case similar to the above, although Dr. Frederick L. Good has recently reported a case\* of pregnancy and labor complicated by a gunshot injury of the spinal cord.

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## OBSERVATIONS ON TRAUMA TO THE UNDILATED BUT DILATABLE CERVIX†

BY PAUL T. HARPER, M.D., ALBANY, N. Y.

THAT cervical and lower segment lacerations result commonly from conduct of the high-forceps operation, while injuries of the kind are both less common and less extensive following performance of internal podalic version and breech extraction, are well-known facts that are doubtless in great measure responsible for the tendency among obstetricians to employ version and extraction in preference to the high-forceps operation when artificial advance is necessary.

But the observation it is desired to record is as follows: immediately after version and extraction the cervix is commonly so short, so high and so thin that it can neither be inspected in position nor brought downward and forward by application of the relatively broad and non-cutting cervix forceps. Determination of extent and, on occasion, even of the existence of possible injury to uterine tissue is therefore most unsatisfactory, and digital palpation of the cervical rim not infrequently has to be depended upon for purposes of recording possible injury, it being left for the routine bimanual examination at end of the second week to determine actual damage done.

Condition of the cervix just described is in striking contrast to that presented by the result of practically all high-forceps operations, and after many of the "medium" variety, where either the anterior lip appears at the vulva or where the entire cervix can readily be brought into view by gentle traction upon it.

High position of the postpartum cervix in the first group of cases is in itself evidence of physiologic dilatation, in the course of which the lower segment is thinned out, and as dilatation of the external

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\*Pregnancy and Labor complicated by Diseases and Injuries of the Spinal Cord. Frederick L. Good, M.D., Jour. Am. Med. Assn., August 9, 1924.

†Read at the Clinical Congress of American College of Surgeons, New York Section, at Albany, N. Y., May 12, 1924.



os advances toward completion, is drawn progressively upward over the presenting part. A physiologically dilated cervix may be expected to suffer no more than abrasion or superficial laceration, and extraction by the breech through a properly prepared uterine orifice can be shown to facilitate the type of dilatation and upward advance of the lower segment that leaves the cervix more or less uninjured.

On the other hand, the fact that the cervix following termination of a high-forceps operation is commonly low is evidence that upward advance of the lower segment did not occur; and the common association of variable laceration is readily explained on the basis of advance of a more or less resistant body through the incompletely dilated external os. Dilatation in cases of this kind is far from physiologic. With each expulsive effort the presenting part advances against the enveloping cervix and lower segment, the latter structures are fixed by pelvic counterpressure, and complete physiologic dilatation is improbable. The latter process is actually obstructed after passive congestion and edema have added to the thickness of the lower uterine musculature. In these cases manual dilatation is ineffectual. Even with the presenting part immobilized by forceps, the rim of the fully dilatable cervix can be displaced upward but there is no force at work to draw the lower segment upward, and both structures advance as soon as tractile force is applied.

A cervix that is incompletely dilated and incompletely dilatable (considering upward advance of the lower segment a necessary feature of dilatation) may be expected to suffer injury when artificial advance through it is produced. Cervical injury, therefore, is to be presumed where high arrest of the head and incomplete dilatation are associated and where instrumental advance is brought about.

Two other features of forceps application are: cutting of the cervix by edges of the forceps blades and downward pull on the broad ligaments. They emphasize the undesirability of an operative procedure that subjects lateral supports of the uterus to that downward pull, which the low postpartum position of the cervix gives evidence of their having been subjected to, and that not infrequently traumatizes the cervix even before the large, rounded presenting part is drawn well into it.

Explanation of the fact that the cervix so often escapes discoverable injury in breech extraction following version, appears to be offered by comparing conditions referable to cervix and passenger that obtain during extraction with those presented during physiologic dilatation in vertex presentation.

In the latter, membranes characteristically remain intact until complete dilatation has occurred, or until the external os and lower segment are thin. At this time each has advanced well upward over the head. Pull of the longitudinal uterine muscle fibers is the active force in producing the advance referred to, but quite as important as

a contributing factor is the shape of the fetal ovoid. Its smooth and generally symmetrical surface, made so by integrity of the bag of waters, offers every advantage to upward advance of cervix and lower segment, and dilatation proceeds uneventfully. Importance of intact membranes in physiologic dilatation may be judged from the complete failure in progressive dilatation met not infrequently when membranes rupture early and the uterine musculature applies itself more or less intimately to the irregularities of the fetal outline in the pathologic state known as "retraction."

While it is true that in breech extraction there is no smooth, fetal ovoid up on to which and over which cervix and lower segment can be drawn, it is the generally parallel sides of the passenger that meet the resistance of the uterine musculature, which is readily drawn upward along the roughly cylindrical body of the child, as the latter is made to advance. Deep anesthesia under which version is done not only makes complete dilatation possible but it also can be counted upon (if actually deep) to insure against the setting-up of retraction, that escape of liquor amnii, and intrauterine manipulation incident to version may be expected to invite.

Skillfully performed version and extraction unquestionably occasion less cervical trauma than does the high-forceps operation in equally competent hands; and the experience of impartial obstetricians bears out the contention. Because the aftercoming head is never called upon to advance through an incarcerated and edematous cervix in breech extraction, while in every high-forceps operation and in many of the high-medium varieties disproportion between pelvis and passenger is increased by thickness of the enveloping lower segment, it may be argued that version and extraction are less dangerous to the child.

Conservatism, therefore, dictates choice of the method of delivery referred to in high arrest of the head; and wisdom dictates that choice be made when delivery is determined upon, while mother and child are good risks, rather than at a time when each has been subjected to the dangers of repeated and ineffectual attempts at delivery by forceps and is, therefore, a less satisfactory risk. It is apparent that it is only as each method of delivery is made elective that its relative merits may be judged.

In what has preceded, attempt has been made to establish a reasonable basis for the contention that version and extraction have a definite place in progressive obstetrics as truly elective procedures: it is believed their utility is actually broader than conservative practice subscribed to no more than a decade ago. It is presented as a contribution toward solution of the important obstetric problem of the day, namely the actual "place of version in obstetrics."

# Society Transactions

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## AMERICAN GYNECOLOGICAL SOCIETY

### FORTY-NINTH ANNUAL MEETING

*HOT SPRINGS, VA., MAY 15, 16, and 17, 1924*

*(Concluded from December)*

DR. M. PIERCE RUCKER, Richmond, Va., (by invitation) read a paper entitled **The Use of Novocaine in Obstetrics.** (For original article see page 35.)

### DISCUSSION

DR. ERNEST WILLIAMS, LONDON, ONTARIO.—Dr. Rucker says that the anatomy of the nervous system of the uterus is pretty well known, but that the physiology is still in doubt, and it seems to me that that is the real thing we wish to know. Gaskell in his work, says that the uterus is supplied by the fibres from the lumbar and gets no fibres from the sacral plexus, but Dr. Rucker's work seems to show that this is not so.

We speak of contraction of the uterus in labor pains and we believe the contracting fibres are causing the pain. I do not know whether it is there or in the dilating lower segment. The question of pain in the uterus has, of course, not been worked out. Some recent work done by F. Miller and Simpson has shown that pain in the stomach originates only in the mucous membrane and travels by way of the sympathetics; and if true, this might be the same in the uterus, the pain is only in the endometrium. It is possible that when the uterus is dilated and the endometrium spread out, that it does not give painful sensations, but later when it is contracted there may possibly be pain originating there.

DR. C. H. DAVIS, MILWAUKEE, WIS.—Dr. Rucker's treatment and conclusions are of interest, but two things of a practical nature occur to me. Do we not need a tonic condition of the pelvic floor for the mechanism of natural labor, especially in rotating the head anteriorly? If we paralyze the pelvic floor, may we not see delay and difficulty in parturition? I understand him to say that this method of treatment is especially applicable for operative cases. I do not see just how that can be, and I welcome further information upon that point. Personally, I have not seen sufficient reason in the reports on sacral anesthesia to adopt it.

DR. COLLIN FOULKROD, PHILADELPHIA, PA.—Has there been any study made of return of sensation in these nerves, and whether it has any influence upon the nerves extending further down?

DR. FRED L. ADAIR, MINNEAPOLIS, MINN.—We have been using an anesthesia we have called "caudal" anesthesia, which I presume is the same as that of Dr. Rucker. We use about 75 c.c. of the one and one-half per cent novocaine solution injected into the hiatus sacralis. This works satisfactorily in most cases for operation on the pelvic floor and vagina, and in a good many cases of intraperitoneal surgery. I think it is of more or less limited usefulness, but I have used it in incurable cases of tuberculosis where the patient was pregnant and

where it seemed necessary not only to terminate the pregnancy, but also, in the opinion of the consultant, it appeared desirable to sterilize the woman. It seemed an anesthesia particularly well adapted to this type of case, and the operation has been done without any particular discomfort to the patient and with satisfactory results from a technical point of view.

DR. RUCKER, (closing).—I think the physiologic aspect is a very interesting one. The sensory distribution of the nerves to the uterus is shown very plainly to my mind. The dilatation of the os is entirely painless, but after you get up into the fundus, the patient complains of some pain.

In regard to the technic, it is that usually described in the textbooks: that is, you inject a given quantity, about 35 c.c.; I first used 20 c.c., but after the articles by Meeker and Bonar came out, I used more. The patient is put in a left lateral position and the sacral hiatus is very easily palpated, except in very fat individuals. Injection is made into the sacral canal. It is very important to emphasize that it is entirely extradural, and of course, not into a blood vessel. The practical management of the obstetric case and the careful selection of the anesthetic you are going to use in any given case, demands knowledge of what that anesthesia does, and I think in certain cases where you are going to have plenty of time and when extreme relaxation of the perineum is needed, sacral anesthesia does have a special place.

In regard to afterpains, I have seen no great difference in patients delivered under sacral anesthesia and those delivered with ether. The effect of the anesthesia wears off in about two hours. It is hard to conceive how you would have any effect upon afterpains unless it would be on account of the increased tone of the fundus, lessening possibly intrauterine bleeding and formation of blood clots. You might have fewer afterpains for that reason, although I have not noticed any difference in these cases.

DR. EDMUND B. PIPER, Philadelphia, Pa., presented a paper entitled **Blood-Stream Infection Treated with Mercurochrome Intravenously.** (For original article see page 17.)

#### DISCUSSION

DR. C. JEFF MILLER, NEW ORLEANS, LA.—I am naturally skeptical until a more general use of the method has been reported, for I am one of those who have passed through the various periods of intravenous medication suggested in the last twenty years, formalin, bichloride, nitrate of silver, and so forth; all of them merely produced a leucocytosis and practically all of them were eventually abandoned. Later came the era of the various silver salts and then Crede's ointment, which in turn were discarded. My personal experience with all of them has been highly unsatisfactory.

In a recent conversation with Dr. Young of Baltimore I received the impression that he was enthusiastic about mercurochrome, but that his best results had been obtained in cases of colon bacilli, and that he had found gentian violet more effective in the gram positive cocci.

Dr. Piper has taken the only method of giving us positive proof of the merits and demerits of this remedy, and we appreciate his scientific researches and valuable data. I am impressed also by the conservative position he has taken in his statement of results.

DR. CAREY CULBERTSON, CHICAGO, ILL.—As I understand it, Dr. Piper secures his blood culture first which, of course, is the proper basis for the intravenous treatment in the blood-stream infection. The outstanding feature of

his report lies in his statement that, after the injections the microorganisms disappear from the blood. This in itself, constitutes a definite advance. I would like to ask whether the method has been used universally in all the blood-stream infections, or in the more severe ones only.

DR. JOSEPH BRETTAUER, NEW YORK CITY.—I have employed mercurochrome injections from time to time, but unfortunately up to date, I find mercurochrome just one more of the many remedies and methods for the treatment of blood-stream infections, not a single one of which has actually proved efficacious. I have at present in my ward a case of severe infection following artificial abortion, with a hemolytic streptococcus in the blood. She was given an intravenous injection of 30 c.c. mercurochrome, after which a violent reaction took place, with no conspicuous change in the general condition. After 48 hours there was a remarkable improvement. She was given a second dose of 20 c.c.; no reaction followed and her condition was not changed. Symptoms of multiple arthritis were the main complaints in this case. The patient developed a left panophthalmitis and died.

DR. JOHN G. CLARK, PHILADELPHIA, PA.—In Dr. Piper's list of cases is one which was transferred from my ward to his service, rather strikingly illustrating the direct value of his treatment. A septic infection had occurred, as I recall, during a miscarriage. When referred to my service, the patient was markedly septic. There was a hard, indurated, nonfluctuating cellulitis extending out in the base of the broad ligaments to the pelvic wall. Under rest, hot douches, and other plans, there was no abatement in symptoms, the steeple-like, elevated temperature persisting—not an extraordinarily ill woman but one who would not get well. Under the injection of mercurochrome, the patient immediately began to recover and was soon well. In this case, the immediate relief of fever and the rather prompt recovery left no doubt in my mind as to the efficacy of this treatment in this case.

Upon the point of chemical antiseptics for the blood, it may be of interest to allude to the remarkable investigations of Sir Almondroth Wright. In presenting this subject before the International Congress of Surgery in London last summer, he expressed the deepest skepticism as to the efficacy of such disinfectants. His claim is that almost any simple antiseptic agent will promptly inhibit the growth of most resistant and vigorous bacteria upon any artificial media, but when introduced into a volume of circulating blood containing active organisms, the chemical has so much greater affinity for other constituents of the blood that none is left to destroy the bacteria, hence it is not only of no value but may actually be harmful. He now is striving to perfect a means of treatment which has a very logical foundation, and one may look with great interest to further announcements from his laboratory. He holds that the use of the various combative area may be of great value if properly adjusted to the patient's physiology, but as usually employed possess many evil possibilities. In other words, if the phagocytic action of the leucocyte is dormant or destroyed through a lethal infection, to inject any serum into such a patient may be the "straw that breaks the camel's back", for there can be no reaction under these adverse conditions. If, however, in the face of such a serious situation the ill patient's blood is typed and the donor is given a stock serum which increases through its reaction the phagocytic activity of the leucocyte, and these virile leucocytes, and not the serum, are segregated and injected into the infected patient, the direct effect may be that of boosting the tired horse up to the top of the hill. His theories are most logical and his technic that of a master.

DR. HIRAM N. VINEBERG, NEW YORK CITY.—It seems to me that the trend of gynecologists has been to ignore the local condition entirely; they believe that it should not be touched. As an illustration of this we had a case reported at the New York Obstetrical Society recently, from a very good clinic, where the woman had been delivered; she had a large fibroid which became infected and the patient was markedly septic and she was allowed to die without any surgical interference. I asked why she had not been operated upon. The reply in rather a contemptuous tone was: "We do not operate for septicemia in our clinic." Now, I could never quite understand the position of our colleagues in that respect. In the case reported by Dr. Piper, the patient was treated surgically in addition to the injections of the mercurochrome. In many of these cases of septic infections, as I have demonstrated in my own practice, there may be a surgical condition which if attended to will help considerably any other treatment and may aid in the cure of the patient. Take the case of Dr. Brettauer's: That probably may have been a case of gangrene of the endometrium. I have not infrequently seen such conditions. Remove the source of infection and the patient surely has a better chance to recover. If such a gangrenous endometrium is allowed to exist there is a constant source of reinfection and it is expecting too much from any bactericide that it will prove victorious. The fear so often expressed by gynecologists of spreading the infection by operating on septic tissues I have never entertained. Its fallacy was strikingly exposed in the surgery of the great war.

DR. WILLIAM R. NICHOLSON, PHILADELPHIA.—I think that in all fairness it should be definitely stated that the patient of mine to whom Dr. Piper, at my request, gave mercurochrome internally was practically hopeless from the start. She had been delivered about two days when I first saw her and at that time had a high fever and was jaundiced, and was fatally sick. I have been sorry that I asked Dr. Piper to give mercurochrome, since I do not think it is fair to expect that mercurochrome will perform miracles in moribund patients.

This woman had one of those tremendously overpowering cases of sepsis; she was in a small community hospital and there were other septic cases in the hospital at the same time. These facts I think should be taken into consideration in judging of the value of this drug. I am frankly in hopes that the work done by Dr. Piper will show the way to an agent which may have the same results as mercurochrome, without the dangers mercurochrome undoubtedly possesses.

DR. WALTER W. CHIPMAN, MONTREAL, CANADA.—Was there an increased leucocyte count after this medication? Of course, we are agreed that the action of the mercurochrome is not directly upon the organism, but that these non-specific irritants merely increase the leucocytosis and that it is the leucocyte that attacks the organism.

DR. BARTON COOKE HIRST, PHILADELPHIA.—I have had an opportunity to observe Dr. Piper's work from the beginning. There has been some confusion about the priority of this method of treatment. Anybody who reads the recent literature on the subject would, I am sure, be quite confused as to whom the credit for this treatment is really due, and to make that clear, at Dr. Piper's request, I am publishing a review of his cases, with which I have really had nothing to do except as an observer, but as an observer I have been naturally intensely interested.

I have had the skepticism to which Dr. Miller refers, but one thing appears plainly from this study: it is possible by a chemical disinfectant to sterilize the blood. That is an epoch-making observation. Whatever becomes of this method therapeutically, if one can sterilize the blood, it must be in many cases an advantage to patients.

The patient apparently gets well by establishment of an immunity. Is this contributed to by an enormous autogenous vaccine? There is a tremendous destruction of the microorganisms throughout the system, and there is an autogenous vaccine in huge doses by this method. Whatever the explanation, I have been converted, having begun my observation of these cases with the same feeling of doubt as to the outcome that every one has who has seen so many methods tried without success. At any rate, one fact has been established: it is possible by a chemical disinfectant to sterilize the human blood stream.

DR. ISIDOR C. RUBIN, New York.—It is interesting to note the suggestion made by Dr. Hirst about what happens in the blood following the injection of mercurochrome; that is, in the destruction of the bacteria there results an auto-vaccination. The proponents of the nonspecific protein therapy claim that even in the specific vaccine therapy it is not the autovaccination that cures but that it is the protein that is released by the destruction of the bacteria themselves that stimulate all the defensive forces that arouse the leucocytes such as Dr. Chipman mentioned.

DR. PIPER, (closing).—I would say to Dr. Miller that I was aware, of course, of all the skepticism on intravenous medication. Every one of those previous methods of intravenous antiseptic medication were empirical. This work was based on a question of dilution in the blood stream. In the dosage that we worked out we give from 5 to 7 or 8 milligrams per kilo of body weight, and that will give a dilution in the blood stream anywhere from 1-16000, or as concentrated as 1-13000. We also showed that the organisms were killed, at least, insofar as we can believe the laboratories. We likewise got an increased leucocytosis. I do believe it has some effect, but I am partially convinced that in the successful cases we create an autogenous vaccine through the destruction of the microorganisms themselves, by the fact that they do not show any reaction usually, in spite of the dosage, where there is nothing in the blood stream.

Again, in reply to Dr. Miller, naturally Dr. Young is quite in favor of the colon bacillus; it is much more easily cured. If he has streptococcic infections in blood stream, they will not all get well no matter what is used. I will give mercurochrome to anybody; if we can get 20 per cent cures in staphylococcic infection of the blood stream in puerperal cases, I think it is better than anything else that has been done in practically moribund cases.

As to Dr. Brettauer's question, I cannot say where the localization will occur, but they get well when they begin to localize, and if the infection will occur superficially or as a pseudomyelitis, they usually get well after a time. Of course, we go after local infections whenever we can find them. I saw a case a few days ago and found an osteomyelitis of the inner side of the tibia; that was not a septicemia but a bacteremia. She had been carrying the infection through the blood stream, but it was not increasing.

DR. KARL M. WILSON, Baltimore, Md., presented **A Morphologic Study of Some Phases in the Development of the Sex Glands of the Domestic Pig.** (For original article see December issue, p. 710.)

#### DISCUSSION

DR. JOHN G. CLARK, PHILADELPHIA, PA.—This paper recalls some observations which I recorded in a study of the circulation of the ovary some years ago. Dr. Wilson alludes to the radical difference in the circulation of the ovary and the testicle. In following the scheme of the ovarian circulation back to a stage

in the embryo when it was so small that the aorta required the blunt end of a hypodermic needle to inject it, I could immediately differentiate the sex by the way the injection fluid appeared in the genital hillock on the wolffian body. If it spread over the hillock through a dorsal branch with hoop, or bandlike radicals, it was of the male type; if on the other hand, it entered the base of the hillock and spread out fanlike it was a primitive ovary. In the ovary of the newborn infant, the graafian follicles are fully differentiated and make up almost the entire ovary, whereas by the time puberty is reached the follicles occupy the peripheral or cortical zone. A vast number have disappeared and the blood vessels and stroma occupy the central space. In adult development blood vessels of no organ in the body possess a more pronounced corkscrew tortuosity. Based upon these observations, I offered a theory that through the wavelike congestion, making up the ovarian and uterine physiologic cycle, the follicles are pushed to the surface and rupture facilitated. Furthermore, based upon this same observation it was suggested that the wide age interval of the menopause, forty to fifty years, may depend upon the blocking of the cortical or follicular circulation. In one instance, the peripheral zone may be blocked early with inefficiently removed corpora lutea, such as are so constantly seen in the menopausal years, as corpora fibrosa, albicantia and nigra, and under these adverse conditions the development of the follicle and corpus luteum are so much thwarted that the climacterium occurs early. In the face of this vascular limitation, induced through stromal fibrosis, the follicles cannot mature and corpora lutea are no longer developed. A woman with a central circulation in the genital gland is definitely limited in fecundity to the menopausal years, whereas man with a peripheral circulation in the testicle, has no limiting years of sterility. In well vascularized ovaries, such as are particularly observed in women who have borne many children, the menopause usually occurs late, even beyond the half-century mark. Likewise, the menopause comes late in women with the larger myomata because of the increase in pelvic circulation. Certainly the menopause is not induced by the disappearance of ova for they may be found in women well beyond the menopause.

DR. WILSON, (closing).—I hope I have not left the impression that sexual differentiation appears at a late day. One can tell from the histologic picture whether the embryo is a male or female. Of course, most of the theories with regard to the determination of sex go back to the time of fertilization, but you cannot study the ovum at this time.

DR. JOHN A. SAMPSON, Albany, N. Y., read a paper on **Endometrial Carcinoma of the Ovary Arising in Endometrial Tissue in that Organ.\***

As endometrial tissue in the ovary not only has the histologic structure of the uterine mucosa, but also reacts to menstruation, pregnancy, and the menopause, as does the latter, it is natural to assume that it would be liable to similar pathologic changes if exposed to the exciting cause, and carcinoma could arise in it.

It is of frequent occurrence, having been observed by me in 64 of 332 abdominal operations for pelvic conditions during last year. One of the most striking features of patients with benign endometrial lesions in the ovary or ovaries and their often associated benign peritoneal implantations, is their close resemblance to malignant ovarian tumors and their often associated malignant peritoneal implantations. Ovarian carcinoma frequently has the same histologic structure as carcinoma arising in the mucosa lining the uterine cavity. Carcinoma of the ovary is of frequent occurrence compared with carcinoma of the testicle, yet both organs have a com-

\*Author's abstract.



mon embryonic origin. This acquired endometrial tissue in the ovary would in part account for this frequency. All this is valuable circumstantial evidence, but it is not conclusive. There is needed the demonstration of both benign endometrial tissue and carcinoma in the same ovary, the two bearing the same histologic relation to each other that is found in carcinoma of the body of the uterus; to indicate the possibility of the origin of the cancer in this tissue and to make it conclusive it must be shown that it actually arose in this tissue and is not invading it from some other source.

In the larger group of cases with ectopic endometrial tissue, the amount of that tissue in the ovary is small and is usually situated on or near the lateral or under surface of the ovary. The associated peritoneal lesions (if present) are usually few in number. Should cancer arise in this tissue it would obscure or replace it and malignant peritoneal implants would usually occur early and would also be apt to cover up any benign endometrial implants possibly present. In the smaller group an endometrial cyst is present and the associated peritoneal implantations are usually much more extensive than in the former group. Should ovarian carcinoma occur in a patient in this group it is usually possible to detect the benign endometrial tissue in some portion of the specimen including the ovary in which the cancer has arisen.

Nineteen specimens of ovarian carcinoma were studied to ascertain whether or not the carcinoma could have been of endometrial origin.

Three were associated with cancer of the body of the uterus.

In four specimens the carcinoma arose in the epithelial lining of an apparently benign ovarian cyst and was associated with a benign endometrial invasion of the wall of the cyst and also of the posterior uterine wall to which the malignant cyst was adherent. In two of these the original cysts were obviously benign endometrial cysts. In the third the cyst was of the type of a serous papillary cystadenoma, but the conditions found indicated that this cyst could have arisen from implanted endometrial (possibly tubal) tissue. In the fourth the malignant cyst in places suggested a previous pseudomucinous cystadenoma. The relation between the benign endometrial tissue in the ovary and the malignant epithelial lining of the cyst was such as to indicate that either the cyst primarily arose from this tissue or the endometrial tissue was being invaded by carcinoma arising in the cyst and the latter was not of endometrial origin.

In three specimens histologically benign endometrium-like tissue was found on or near the surface of the ovary and cancer was found replacing its epithelium or arising from it.

Some of the other ovarian carcinomas not demonstrated to be of possible endometrial origin nevertheless could have been.

The study of this small group of cases shows that some, and suggests that possibly a large percentage of ovarian carcinomas are of endometrial origin which is in accord both with the frequency of endometrial tissue in that organ and with the endometrial type of many ovarian cancers.

## DISCUSSION

DR. JAMES R. GOODALL, MONTREAL, CANADA.—A new chapter has been opened in gynecology, and what strikes one most in regard to these adenomatous structures is that their great frequency has been demonstrated. In his paper today, as I understood it, the primary object was to demonstrate that these tumors are susceptible of malignant change. When we study these endometrial tumors we find that they have the power of transplantation, and that whenever they are transplanted they grow in a manner which invades to a great degree structures of the uterine wall which resist, as we all know, infection. They cause

by their irritating effects reaction round about the endometrial tissue, and they have also the factor of drawing out blood of a menstrual nature, which must also cause considerable irritation. Here we have ectopic tissue with all the potentialities of malignancy. And in one of Dr. Sampson's tumors, skepticism must be completely buried, because the transition from the endometrial tissue to the malignancy could be convincingly demonstrated. Dr. Sampson thinks it is possible that in the other case a smaller cyst in the immediate neighborhood may have burst and invaded the endometrial cyst.

An interesting question arises with regard to these implantations. What happens to them in the course of the sexual life of the woman? Either we must conclude that they grow exceedingly slowly or that at some time or other they retrogress because cases will occur where the invasive process has gone quite wide of the point of implantation, involving the rectum and the rectovaginal septum. But if these implantations take place early in the woman's sexual life and they do not become malignant, except possibly on rare occasions, then the inference is, I think, quite clear that their growth must be exceedingly slow.

Of course, the point of greatest interest is the origin of this endometrial tissue. Dr. Sampson has advanced a very ingenious explanation, and that is the drip from the fimbriated end. This may be stimulated by many causes, possibly by dilatation of the cervix, forcing the blood out through the tubes, or there are many other conditions which might arise to cause back pressure. There are other conditions which we must envisage from a scientific point of view; they are probably these: If we make sterile sections of normal ovaries to determine what structures there are in which the tumors may arise, we find that the fimbria ovale where it joins up with the ovary invades the ovarian tissue to a more or less degree in about 30 per cent of cases with typical endometrial tissue, but these may be unaccompanied by interstitial tissue which we almost invariably find in connection with the endometrial implants.

The second important thing is, is this a metaplasia? I think it would be rather far-fetched, although in the bitch and in the cat I have frequently demonstrated that the surface epithelium of the ovary may change in its character, take on cilia and a variety of cells can be found in the lower animals showing that this tissue has potentiality for differentiation which we should expect, knowing its origin and the structures to which it may give rise.

Discussing Dr. Wilson's paper on embryology, I have gone into this rather intensively in comparative anatomy in young animals and we find that the ovary at one time has as complete a set of tubules running to its surface as has the testicle, but they atrophy because afterward in some of the animals, especially the pig and the bitch, we can demonstrate the central body in the ovary which corresponds to the epididymis in the male. This has also been taken up by myself in the human and it is extraordinary how rarely we find a human ovary which has these structures which have not undergone atrophy or complete destruction.

This leads us to the question, are these ovarian ectopic tissues but the primary origin of these growths? If any of them take on activity, as they frequently do, we find that the lining of these structures shows a multiplicity of characters so differing that it seems almost impossible that they should arise from one type of tissue, but knowing the character of tissue from which they arise, and bearing all the character of the tissue of the ovary, our surprise is perhaps less marked.

DR. EMIL NOVAK, BALTIMORE, MD.—Like Dr. Goodall, I am frank to say I came in a somewhat skeptical frame of mind, but, like Dr. Goodall, I left as a convert. I believe Dr. Sampson has made the most important contribution of recent years in the field of gynecology. With regard to his first case of endometrial carcinoma of the ovary, I can find no flaw in his interpretation. He has demon-

strated a cyst lined by perfectly definite endometrium with perfectly definite carcinoma arising in it. His other three cases were much less convincing to my mind, for in all of them it seems just as likely and perhaps more plausible that the carcinoma had arisen in a previous cystadenoma of the ovary. But, as Dr. Goodall has said, the one case has established the principle and, while we may not agree that most carcinomas of the ovary are of endometrial origin, I do not see how we can deny that some of them are.

With regard to the general subject of Dr. Sampson's implantation hypothesis, I may say that Dr. Sampson has taken a very fair-minded position. Many investigators believe that the endometrial islands found in various points in the pelvis are due to peritoneal metaplasia. I shall not go into the evidence in favor of this viewpoint, but it is not unimpressive. On the other hand, in many of Dr. Sampson's sections, the endometrial areas certainly suggest something plastered on from the outside. The matter of regurgitation from the tube is still an open one. I have discussed it with embryologists who look upon the menstrual regurgitation idea as extremely improbable. Furthermore, I may say that in a recent series of twelve cases, in which the operation was done during menstruation, no blood was found in the pelvis of any patient. To sum up, it seems to me that Dr. Sampson has shown conclusively the occurrence of definite endometrial tissue in various locations in the pelvic cavity; that he has made out a good case for the implantation theory; and that he has shown that at least some cancers of the ovary arise from endometrial tissue in the organ.

DR. SAMPSON, (closing).—Dr. Goodall brought up the question of the influence of pregnancy on ectopic endometrial tissue. It is identical with that on the mucosa lining the uterine cavity as far as a decidual reaction is concerned. We find these decidual implants more frequently in certain groups of patients and less frequently in others. They occur more often and are usually more markedly developed in women who have not had children (or none in several years) and who are operated upon for uterine leiomyomas, retroflexion of the uterus and conditions resulting from endometrial implantation. We find them much less frequently in operations for the relief of conditions resulting from the injuries of childbirth and from pelvic inflammatory disease. It would seem that pregnancy or the results of pregnancy may lessen the incidence of these implants or may actually cause a retrogression of any already present.

I wish again to emphasize the frequency of ectopic endometrial tissue. During this last year, representing a little less than eleven operative months, 98 instances of this lesion were encountered in 332 abdominal operations for pelvic conditions. In all of these cases some of the ectopic endometrial tissue was examined microscopically and all showed the histologic structure of endometrial tissue as found in the invasion of the uterine wall by the mucosa lining its cavity. The implants may be present only on the peritoneum or only on the ovaries, more frequently on the peritoneum, but often on both. In sixty-four of the cases one or both ovaries were involved.

DR. JAMES C. MASSON, Rochester, Minn., presented the report of a  
**Case of True Hermaphroditism.** (For original article see page 81.)

# NEW YORK OBSTETRICAL SOCIETY

MEETING OF OCTOBER 14, 1924

THE PRESIDENT, DR. R. M. RAWLS, IN THE CHAIR

DR. HOWARD E. LINDEMAN presented the following case reports, (1) **Intrauterine Pregnancy Following Two Tubal Pregnancies, (2) Three Successive Tubal Pregnancies in One Patient.**

CASE 1. Miss D. R., age twenty-nine, was first seen October 11, 1919, having been bleeding constantly for seventeen days. She had been operated on four and a half years previously for chronic appendicitis, and six months later her gall bladder was drained, and she received medical treatment for a gastric ulcer. A year later a perirectal abscess was incised and drained. There had been no pelvic symptoms at any time.

Her menses which began at fourteen, had always been regular and four-weekly up to two years before, since which time they occurred irregularly at two to three week intervals. They had always been of six day type, moderate in amount and without pain. What she called her last period had occurred on September 21-27 and was apparently normal. Three days later she began to bleed again and bled constantly up to her visit to me. The amount was about the same as at a regular period. There had been no clots and no pain. The blood had been bright at times, dark at others, and for two or three days had had a foul odor.

On examination I found an apparently healthy, well developed, young woman. The hymen was lacerated and the introitus readily admitted two fingers. The orifices of the Skene and Bartholinian ducts were not reddened and there were no vulvar signs of gonorrhea. There was a small erosion surrounding the external os and a moderate bloody discharge from the cervix which was otherwise negative. The uterus was anterior, freely movable, moderately enlarged and softened. The right adnexum was apparently normal, but a small, soft, tender, cystic mass could be felt on the left side. No definite diagnosis was made.

Three days later, October 14, the patient had a sudden attack of cramps in the left lower quadrant and felt faint. The bleeding had remained about the same. At this time her temperature was 99.6° and her pulse 76. A diagnosis of ectopic gestation was made and she was operated on at the Misericordia Hospital a few hours later. On opening the peritoneal cavity a small amount of free blood was found. The right tube and ovary were normal. The left tube and ovary were prolapsed and adherent to the broad ligament and there was a swelling about the size of a walnut at the junction of the outer and middle thirds of the tube. A few small blood clots were protruding from the fimbriated end of the tube. A left salpingectomy was performed, the line of section passing through and leaving part of the ovary. The raw surfaces were peritonealized and the wound closed in the usual fashion. The specimen showed a typical tubal pregnancy, unruptured, and with a pea sized ovum in a mass of clots.

On January 7, 1920, just a little less than three months after her first visit this patient again came to my office with the statement that she "has one on the other side." Her last period had been on November 29. On December 20, one week ahead of time, she had spotted for seven days, had stopped for a week and then had bled freely for one day and moderately up to the time of her visit.

On that morning she had passed a smooth piece of membrane. For two weeks there had been colicky pains, at times sharp and radiating into the thighs, morning nausea, occasional vomiting and dizziness once, but no fainting. The pains were exactly like those on the previous occasion.

Examination showed a soft cervix with moderate bloody discharge, an enlarged uterus, and a small tender mass on the right side.

She was operated on at Flower Hospital two days later. A small amount of free blood was found in the abdomen. The left broad ligament stump was found rigid and short, but not thickened. In the right tube at the junction of the outer and middle third was a typical appearing ectopic pregnancy about 2 cm. long and one cm. in diameter. As the patient was still unmarried and might desire a pregnancy at a later date a conservative operation was considered advisable. The tube over the ectopic was split and an attempt made to shell out the ovum. But it was so adherent to the tubal walls that considerable damage to the tube resulted and it was finally necessary to resect the distal third of the tube, through the dilated site of the pregnancy. The walls were then cuffed back on the tube and sutured in position. The wound was closed in the usual manner and the patient made an uneventful recovery.

Following this the patient was perfectly well and with normal regular periods up to May 2, 1923, about three years. The next period did not appear and when two weeks overdue a diagnosis of pregnancy was made. I did not see her on this occasion. As the patient was still unmarried, she had an abortion performed June eighteenth. She has been perfectly well since, and has had no further pregnancies. She is still single but expects to be married and I hope that at some future date I may be able to report to you that this patient has had a full term pregnancy.

CASE 2. Mrs. F. H., (181170), twenty-four years old, was admitted to Brettauer's service at Mount Sinai Hospital on April 8, 1918. Her past history was negative except for frequent fainting spells for many years. Her menses which had begun at thirteen had always been of regular thirty day type, lasting three days and without pain. She had been married six years and had one child four years old. She had had an abortion performed at two months in 1916 which was followed by an infection and seven weeks' illness.

Her last regular period had occurred January 18, 1918. On February 15 she had bled for three days, stopped for two days and had then bled again up to the time of her admission to the hospital in April. At times she had only spotted, at other times she had bled freely, sometimes bright red, at other times dark. For two months she had had attacks of sharp pain in the right lower quadrant radiating into the back. There had also been burning pain at the end of urination during these two months.

Examination showed a well developed young woman not acutely ill. There was slight tenderness at and below McBurney's point and considerable dark bloody discharge from the cervix. The uterus was slightly retroposed, anteфлекed and not enlarged. There was a freely movable cystic mass in the left side, but the right adnexum was clear. She was operated upon April 11, 1918. The uterus was very slightly enlarged and firm. The left tube and ovary were normal. The right tube was enlarged at its fimbriated end by an almond-sized mass and blood and clots protruded from the ostium. There was no perforation. The tube was removed in the usual manner, the stump peritonealized and the abdomen closed. Her recovery was uneventful.

Five months later, on September 30, 1918, she came to my office. She had had no intercourse following the operation until early in August. Her periods had been regular from shortly after the operation until August 12. The period

due September 10 had not occurred but on September 17th she had spotted for a few minutes. There had been no further show of blood until the night of September 28 when there was quite a gush of bright blood. On September 16 and 19 there had been attacks of severe cutting pain across the lower abdomen and this had been repeated on September 29. With these attacks she felt faint but did not lose consciousness. With this and the preceding ectopic she had had heartburn but at no other time and she therefore suspected that she had a repetition of the condition.

Examination showed a negative introitus and cervix. The uterus was somewhat retroposed, moderately enlarged and slightly softened. There was resistance in the left fornix, but there were no masses and no tenderness.

She was admitted to Brettauer's service at Mount Sinai Hospital three days later. Four days after admission, October 7, 1918, she was operated on by Brettauer. The outer two-thirds of the left tube was found to be much distended by blood clots. During the process of delivering it through the abdominal wound rupture occurred and a large mass of clotted blood escaped. The outer third of the tube was amputated and the abdomen closed, without any attempt at a plastic procedure. She made an uneventful recovery, and nothing further was heard from her until about one year ago when she telephoned me that she was again a few days overdue and spotting and made an appointment to see me at my office on the following morning. In the morning however her husband telephoned me that she would not keep the appointment as she had been suddenly taken sick during the night, rushed to a hospital and operated and another ectopic found. Since then I have heard nothing from her and all my attempts to locate her and obtain some definite facts as to the findings at that operation have been unsuccessful.

#### DISCUSSION

DR. JOHN O. POLAK.—The handling of these tubes depends on the type of infection. In the cases of endosalpingitis, conservation of the tube is an extremely dangerous proposition. A large number of cases occur as the result of infection following abortion, where there is a perisalpingitis. And one can take a greater risk in conservation of the tube.

DR. GEORGE W. KOSMAK.—In this connection I should take the opportunity of reporting a case in which I personally delivered a woman of six children after her first pregnancy, which was an ectopic. I think that is a pretty good argument for leaving an intact tube in place.

DR. HENRY C. COE.—I recall a specimen now in the Johns Hopkins Museum, in which Whitridge Williams took considerable interest. I reported the case twenty years ago at a meeting of the American Gynecological Society as an example of possible external migration of the ovum. There was a typical ectopic in the right tube and the ovary was sclerotic. On the left side there was a fairly normal ovary and lithopedion about the size of my fist; so that it was an interesting question as to how she became pregnant in the right tube when the right ovary was completely destroyed and the left ovary was apparently normal.

DR. ALBERT M. JUDD.—I personally believe that too many tubes which present ectopics are sacrificed. Where it is decided that a tube should be removed I believe that it should be cut out of the cornu of the uterus rather than amputating it.

DR. HIRAM N. VINEBERG.—I recall a case reported several years ago in which a tube was removed near the uterus for pyosalpinx. This woman came to my office some time afterwards, complaining of pain and bleeding from the

bowels. I believed that it might be an ectopic mass on the right side. It proved to be in the little stump which was left behind from the pyosalpinx operation. The intestine was adherent to the bowel and the ectopic had perforated into the same.

DR. FRANK R. OASTLER.—I saw a second ectopic occur in the stump of a tube in which there had been an ectopic and which had been removed at the time. To start with, the first ectopic occurred on the right side and then there was another ectopic in the stump on the same side. I operated on the patient on both occasions. I should have cut the tube out in the first place.

### DR. DOUGAL BISSELL presented the report of two cases of **Hyperemesis Gravidarum Treated with Blood Transfusion.**

CASE 1.—Mrs. C., age nineteen, became pregnant about July 15, 1923, during her first month of married life. She was first seen by me Aug. 1, 1923. Her weight was 160 pounds, height 5 feet 9 inches, appetite good, no nausea or vomiting. The uterus was completely retroverted; corpus was replaced and held in position by a well fitted Emmet pessary. On Aug. 14, uterus was in normal position but since last seen she had been nauseated every day with occasional vomiting. On Aug. 29, patient reported that nausea and vomiting were persistent. She was allowed to leave the city on a visit of a few days, during which time there was very little nausea and no vomiting. Returning home by water she encountered a severe storm and became very sea sick. On Sept. 6 the corpus was again retroposed. The pessary was removed, corpus again replaced and held in position by cotton tampons which treatment was continued until Sept. 28 when it was discontinued for a time because of considerable blood being found on the tampons. From Sept. 10 to Sept. 28, patient was kept in bed on a dry diet and during the latter part of September there was less nausea and vomiting. On Oct. 2 the uterus was in a very low position and the muscles of the vaginal outlet greatly relaxed—cotton tampons were again resorted to but discontinued after one week because of a bloody discharge. Although vomiting was not quite so persistent, patient had lost 50 pounds. Urine at no time showed kidney pathology, blood examination Oct. 10 showed a decided diminution in the number of red corpuscles with a somewhat low leucocyte count and a normal differential count. Hemoglobin 50 per cent.

On Oct. 12, 1924, transfusion was agreed upon with the hope primarily of improving her general condition and saving the child, not with the definite purpose of stopping emesis. Two hundred fifty c.c. were agreed upon as a probable safe amount to begin with.

The patient was admitted to the hospital Oct. 12, 1924, temperature 99.2°, pulse 96, and persistent pain in the lower abdomen. On Oct. 13 blood chemistry examination, CO<sub>2</sub>, 48; blood urea nitrogen 10.5 mg.; blood sugar 0.11 per cent; Group II, hemoglobin 45 per cent, blood pressure 112 over 68. During the morning of this day, patient vomited a number of times, complained of feeling very tired. Just before transfusion, she was given a little minced chicken, toast and tea. At 2 p. m., 250 c.c. of blood were given by the Unger method. The patient rested comfortably until 8 p. m. when she became nauseated but did not vomit. Bromide of soda 40 gr., chloral hydrate, 20 grs., were given by rectum. Patient had a comfortable night. No reaction followed transfusion.

On Oct. 14, she retained roast beef, toast, asparagus, minced chicken, rolls and tea. This diet with slight variation was continued each day after. At no time after transfusion did she vomit food. Three days after transfusion blood showed marked improvement, hemoglobin 65 per cent. Before transfusion the patient

was mentally depressed but within 24 hours after transfusion there occurred a marked change in this respect.

The patient was delivered of a normal child about two weeks before the expected time of labor.

CASE 2.—Mrs. B., age 31, married thirteen years, one child eleven years old. Last menstruation, May 2-5, 1924. Was first seen by me July 25, 1924. Since May 30 has been vomiting after every meal and often between meals, during the past seven weeks has lost 10 pounds, occasional headaches, very nervous, does not sleep well, occasional constipation and at times resorts to cathartics and enemas. Patient was advised to rest in bed and was given a limited dry diet for ten days, without relief. She was then sent to the hospital. Again a limited dry diet treatment was followed for eight days, but emesis persisted. Hypodermatoclysis was administered once. Glucose 5 per cent, and soda 2 per cent—6 oz. per rectum on three occasions. Murphy drip was attempted several times but unsuccessful because of the loss of sphincter tone. Urine and blood normal—each day, however, she was losing ground physically and her mental depression was becoming a serious problem. As the blood was normal in this case, no thought was given to the idea of transfusion when she was sent to the hospital, but when it was found that relief was not afforded by rest and diet under close observation, transfusion was resorted to empirically. On Aug. 12 she was given 250 c.c. of her husband's blood; both belonged to Group IV. No reaction followed—on the following day she vomited three times but slept well that night and felt greatly improved mentally the following morning.

From this date on she ate heartily and only once vomited her food. On two other occasions slight emesis occurred but at times when the stomach was without food. The most striking change following the transfusion was in the mental attitude of the patient, for within 24 hours her depression had ceased, she smiled for the first time in months and though occasional vomiting occurred as noted, she was not in the least discouraged. She was last seen Oct. 8 no vomiting had occurred since leaving the hospital and she is in the best of health mentally and physically. Labor expected Feb. 12, 1925.

It will be noted in neither of these cases was there discovered pathology in any of the organs. The loss of flesh and physical strength and the poor blood picture were in addition to persistent vomiting, the outstanding features of the first case. In the second case we find comparatively little loss of flesh, great mental depression but no change from the normal blood picture.

#### DISCUSSION

DR. ASA B. DAVIS.—About eight years ago, Garnett, of Washington, reported as I recall it, five cases in which he had employed transfusion for hyperemesis gravidarum, with excellent results. Soon after this report appeared a patient was admitted to the Lying-In Hospital who had been previously carried through what we considered a very serious period of pernicious vomiting, recovered under treatment and was safely delivered of a full term living child. On her second appearance, her condition was even worse than in her former pregnancy. On the strength of Garnett's report I gave her, I believe, 800 c.c. The result was as pronounced as it is after a severe acute hemorrhage. She went on to full term, her general health improved immediately, and she was delivered of a living child. Soon after this another similar case was admitted whom we transfused in the same way hoping for like results, but in so far as we could see there were no results from this treatment, and it was discontinued thereafter in such cases.



In relation to the use of serum, I would like to say that in many of these cases of hyperemesis, even if the pregnancy is terminated, they are so depleted that some pass out no matter what form of treatment is employed. Some years ago, Welch, Pathologist at the Lying-In Hospital, brought out the serum treatment for hemophilia. We tried serum in one of the cases of pernicious vomiting after the uterus had been emptied. A considerable number of her relatives came forward and supplied blood for the serum which was given to her daily by hypodermic in the cellular tissue. It is my recollection that in the course of one week something like eight quarts of blood were employed for this purpose. The patient finally recovered. I recall Welch's theory at that time was that this serum furnished easily assimilable nutrition when the patient was unable to digest or absorb food.

DR. HAROLD BAILEY.—It was my impression that the two cases reported by Bissell were the first cases in the literature in which transfusion aided the patient so that she could go on with her pregnancy. The first report that I know of was by the late Dr. Lindeman. In his case the uterus was emptied and a transfusion done. The patient was in a very serious condition but recovered. However, this method of treatment is not always successful. I have three cases which I have transfused. One woman received 600 c.c. of blood and although the blood matched, she showed symptoms of hemolysis and the transfusion had to be stopped. For a time there was improvement but eventually, after losing 40 pounds, the uterus had to be emptied. A second woman was transfused on the same day, receiving 500 c.c. of blood by the citrate method. She improved temporarily but it was necessary to empty her a week later at which time she had lost 32 pounds. The third case had all the signs of acute yellow atrophy and had been operated upon for appendicitis. She was very much jaundiced and comatose when she was admitted to my ward. She was emptied and transfused on the same day and recovered.

In 1911, two Germans, Freund and Mayer, gave normal pregnancy serum to women who were vomiting and found that the results were very good. They later found that it was not necessary to give normal pregnancy serum as normal human serum gave the same results. However, I tried the pregnancy serum in half a dozen cases with great success. After these women had received about 100 c.c., which was the highest dose I gave, their condition improved amazingly and they went on to complete recovery. It seemed almost as though the serum added something which aided the body in building up a resistive substance to fight this type of toxemia.

DR. HERMANN GRAD.—In a case of very severe toxemia of pregnancy two years ago, I gave the patient blood serum from a pregnant woman after everything else had failed. I gave this woman 40 c.c. of serum on one occasion and 60 c.c. on another, with the result that her nausea stopped and she went on to full term, but became totally deaf after a normal labor.

DR. E. A. BULLARD reported a case of **Abdominal Pregnancy**.

Mrs. A. M., white, age thirty-two, was admitted to Woman's Hospital on Dec. 10, 1923, with a temperature of 104.6°, pulse 125, white count 11,000, with 89 per cent polys, red cells 3,850,000 and hemoglobin 80 per cent. She was vomiting occasionally, had a chill on admission, and complained of frequent pains in lower abdomen.

Patient had enjoyed excellent general health up to the present illness. Menstrual history had been normal; married five years; and pregnant for the first time; her last menses having occurred July 18th to 21st.

Three weeks before entering the hospital she fell, striking her abdomen against

a railing. This was followed by several days of severe abdominal cramps and moderate uterine bleeding. For a week or so she felt generally better, then the pains returned she began to have fever and chills and she was referred to the hospital.

Our first examination noted a well-developed young woman obviously seriously ill. The abdomen was moderately distended, tympanitic and very tender everywhere. Vaginal examination revealed a symmetrical uterus apparently five months' pregnant. The cervix was soft, not dilated and no bleeding present. Repeated auscultation failed to discover a fetal heart.

A diagnosis of accidental hemorrhage with partial separation of the placenta, death of the fetus, and infection was made.

As the patient's condition seemed to be growing worse, we felt that the uterus should be encouraged to expel its probably infected contents. Accordingly, three days after admission, a rubber tube and gauze were packed into the cervix and lower uterine cavity. This was repeated but failed to excite uterine contractions. Finally, on Dec. 20, six days after the first attempt at induction of abortion, as the patient's general condition was decidedly worse, vaginal cesarean section was undertaken. To my amazement, after I had split the anterior lip of the cervix, I found the uterine cavity only four inches deep and empty. We now realized that we had an ectopic pregnancy to deal with, but because of the patient's very poor condition I decided not to add any more operative shock that day.

On the following morning the picture of general peritonitis was more severe; pulse feeble and averaging 140, temperature 103°, abdominal distention pronounced and vomiting frequent.

Under local anesthesia the abdomen was opened rapidly. Foul smelling bloody serum and many old clots welled out and peritonitis was obvious. A large placenta was found in the left lower abdomen well above the uterus and apparently attached only to loops of intestines. Lying behind the placenta with its head upon the bladder was a fetus of about five months. I cautiously extracted the fetus which was dead but not macerated, and ligated and cut the cord. Delivery was followed by a profuse gush of fresh blood, undoubtedly from accidental separation of some portion of the placenta. This hemorrhage was promptly stopped by packing five large laparotomy pads under the placenta. The incision was rapidly closed with the tapes attached to the gauze pads protruding from the lower end, and the patient left the table seemingly no worse for the operation. A transfusion of 500 c.c. of blood was given immediately by the Unger method. In spite of this her condition became steadily worse and she died about four hours later.

The following extracts were taken from the autopsy report of Lawrence Strong.

Two thousand cubic centimeters of bloody serous fluid free in the abdomen,—most purulent in the upper abdomen. A placenta fifteen centimeters (15 cm.) in diameter presents in median line and extending to the left. It is attached to sigmoid, descending and transverse colon, to small intestines and perinephric tissues of left side. All points of attachment to the gut are dark red and greenish; in places the attachment is very firm and cannot be separated, while for the most part the attachment is loose and necrotic. No trace of membranes. Liver shows fatty degeneration. Kidneys show cloudy swelling. Uterus measures 10 x 12 cm. at fundus and wall 3 cm. thick there. Mucosa rough and hemorrhagic, does not appear thickened. Right tube 12 x 1 cm., fimbriæ extremity obliterated, lumen admits probe. Left tube 9 x 1 cm., lumen not visible, does not admit probe. The outer extremity was continuous with the sac of the ectopic. Neither ovary identified, microscopic examination showed.

Right tube near outer end shows minute lumen with few rudimentary plicae and muscular wall slightly developed.

Left tube; outer end more rudimentary than right, no plicae. Section from tip of left tube shows some plicae which are short and low.

Section from left mesosalpinx shows a few corpora fibrosa in a dense ovarian stroma. This was from a whitish nodule 1 cm. in diameter. No ovarian tissue discovered on right side.

We have here a uterus hyperplastic to the degree consistent with a well advanced ectopic gestation. The hyperplasia is of the muscular wall and not decidual. The tubes are of approximately normal length but markedly aplastic in muscular wall and mucosal development. This is explicable either as rudimentary development of the tubes or possibly as representing the isthmic portions greatly elongated through tension. This latter explanation does not obtain, however, since the condition is bilateral and neither tube shows any ampullary portion. The ectopic gestation is an abdominal one, presumably originating on the left side since the right fimbriate extremity was closed. Neither tube exhibits any sign of an original tubal nidation (hemorrhage, or inflammatory reaction). We have one atrophic ovary, the left at a considerable distance from and entirely uninvolved in the gestational tissues. Since no trace of the right ovary was found, of course we cannot deny the possibility of a right ovarian nidation, but there is nothing to suggest this.

### DISCUSSION

DR. HERMANN GRAD.—There are two important points to consider. The first is the very great difficulty in diagnosis. The patient gave a very clear history of trauma, and we made a diagnosis on that basis. On palpation, it was very difficult to say that there was anything else but a pregnancy. The autopsy, however, showed an entirely different condition. I believe this death was due to a severe injury to her intestines. There was a big abscess under the large bowel which, it seemed to me, was in no way connected with her abdominal pregnancy. She was a very sick woman when she came to the Hospital. Nothing radical could be done and we simply thought that by inducing labor perhaps she would expel the dead fetus.

As regards primary abdominal pregnancy, it would be very difficult to prove this because we know in ectopic after the tube expels the products of gestation, the tube recovers and becomes normal afterwards. That was what Dr. Strong found in this case.

DR. ASA B. DAVIS.—I have seen eight cases of abdominal pregnancy, all beyond the fifth month of gestation and in each there was one outstanding symptom, sensitiveness and tenderness upon palpation of the abdomen.

DR. W. P. CONAWAY.—I recall a case in a young colored woman who was sent into my ward for relief of an abdominal pregnancy at six months, the diagnosis of pregnancy having been made on the outside. We felt that it was a tubal condition. I operated and found a six months' pregnancy on the right side which had been apparently a tubal pregnancy. There were no adhesions. All I did was a salpingo-oophorectomy on the right side, with removal of a 5-pound baby and the placenta, which came out easily. I closed her without drainage and she made an uneventful recovery. The pathologist reported that it was more of a tubal than an ovarian pregnancy.

DR. E. A. BULLARD.—Perhaps it is of no great importance to prove whether there was a primary abdominal implantation of the placenta in this instance. The following points favor it. The tubes were of rudimentary type with no plicae and no ampullary portions. Not only was the right tube firmly closed but no right

ovary could be found. The left ovary was a very small rudimentary affair. The placenta lay in the left side of the abdomen and a long distance from the tube and ovary and there were no adhesions or any connection between either adnexa and the placenta. Dr. Strong contends that microscopic examination always finds an area of evidence of a previous implantation in any tube that has once contained a pregnancy. These tubes showed no trace of such changes. It seems to me that our evidence in favor of a primary abdominal nidation is strong.

I heartily accept Studdiford's suggestion that we should have passed a sound before doing vaginal hysterotomy.

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## OBSTETRICAL SOCIETY OF PHILADELPHIA

*MEETING OF JANUARY 3, 1924*

THE PRESIDENT, DR. WILLIAM E. PARKE, IN THE CHAIR

DR. HOWARD A. KELLY, of Baltimore, read by invitation a paper entitled **Curettage of the Uterus on the Office Table—a Routine Procedure.** (For original article see page 78.)

### DISCUSSION

DR. EDWARD A. SCHUMANN.—Kelly's procedure seems to possess all that he claims for it, there being but three objections. I do not believe that it is only necessary to obtain merely a small amount of tissue. In a suspected case it is important to have all the endometrium if a diagnosis is to be made. The second point I take exception to is the diagnosis of unstained tissue. The third objection is the performance of curettage without the use of an anesthetic. I believe that with the use of nitrous oxide anesthesia even so trivial a procedure as diagnostic curettage can be carried out better and to the greater ultimate satisfaction of patient and physician if it be done in a more formal manner. However, the advantages Kelly mentions, namely, the saving of time is an important factor and the saving of anticipation on the part of the patient is valuable.

DR. BROOKE M. ANSPACH.—As Schumann has intimated, it seems almost like heresy to disagree with Dr. Kelly for he has been the leader in gynecology for many years and yet I cannot help but disagree with him in this instance. First of all, I should consider it problematical whether any method of disinfection of the vagina short of thorough scrubbing of the vaginal walls and the use of a disinfectant solution, as preparatory to curettement, would be sufficient. Years ago, when the parts were prepared for operation before anesthetization, a bivalve speculum was introduced into the vagina and by rotating it in various directions and using gauze sponges with plenty of green soap and water, all parts of the vagina were gently but thoroughly cleansed and then an antiseptic solution was used in the same way. In later years we have been in the habit of scrubbing the patient after anesthetization when, of course, the muscles are relaxed, and especially in a multiparous woman, there is ready access to all parts of the vagina. It seems to me that any method of disinfecting the operating field which is not as good as it can be made, does not properly prepare the patient for operation.

Another objection to the procedure Doctor Kelly advocated is the inaccessibility of certain parts without an anesthetic. It is necessary for diagnostic curettement, in order to exclude carcinoma, to make sure that every part of the endometrial cavity is curetted, to preserve all of the scrapings and to cut sections from every part—otherwise, we may overlook a very small and beginning carcinoma. How can we

be sure, without anesthesia, that we have reached every nook and cranny of the inside of the uterus; indeed, there are some cases in which there is distortion of the uterine interior as the result of myomata when even with anesthesia certain parts of the endometrium are inaccessible.

When one speaks of diagnosing carcinoma with a pocket lens, he is treading on dangerous ground. Even with the most suitable fixation and preparation of tissues one is many times obliged to study a large number of sections in order to be able to say whether a malignant condition existed or not. This is not unusual in borderline cases. If, with a high powered lens and the best prepared sections, there is any doubt, how much could be expected from the pocket lens? It would seem to me little more than naked eye judgment. The gross appearance of the curettings in many cases gives us what proves to be a correct opinion, but we can only verify such an opinion by a histologic examination.

I have no doubt that in Dr. Kelly's hands, skillful master-surgeon that he is, curettement in the office has done no harm and may be productive of satisfactory results—but, for myself and for the majority of even those who specialize, I think it would be a very unwise practice.

DR. CHARLES C. NORRIS.—In cancer of any part of the body, the chief point of prognostic value is early diagnosis. At a recent meeting of this Society, M. E. Vogt and I reported the end-results secured in a series of 115 cases of carcinomata of the fundus. Of these, about 25 per cent were early cases. At the time of writing 59 per cent of this series are dead and only 31 per cent of three year cases were alive. The figures are sufficient to emphasize the importance of the early recognition of this neoplasm. Any means which will facilitate an early diagnosis is therefore welcomed. In advanced cases, the clinical diagnosis may be easy, but in the early cases, particularly those occurring prior to the menopause, the clinical diagnosis is always difficult and in many instances impossible. From the figures previously quoted, it is evident that it is the early recognition of this tumor that is important.

Vogt and I referred to the Clark test, which consists in the gentle and aseptic raking over of the endometrial cavity with a sterile sound. Whereas this is not an absolutely certain test, it nearly always produces a little bleeding if cancer is present and the absence of bleeding goes a long way in excluding carcinoma. This is an office test, requires no special instruments and is suitable for the use by the general practitioner and for this reason is of special value. Kelly's suggestion goes a little further and in the hands of an experienced gynecologist is, I am sure, a safe and valuable procedure.

Diagnosis from curettings is possible in practically every case, but to make the diagnosis, the pathologist must have the tissue. I do not believe that an office curettage without an anesthetic can be as complete and as certain to provide the pathologist with the cancer tissue as a thorough curettage under anesthesia. The uterine cavity possesses a surface of almost 20 sq. cm. The series of fundal carcinoma previously referred to, contained a number of cancers of less than 1 cm. in diameter and R. Mayer has recently recorded instances in which the cancer has been entirely limited to a small tumor in the otherwise normal endometrium. To detect routinely such small neoplasms a very thorough curettage is necessary. In the average case, however, when the tumor projects considerably beyond the surface of the mucosa and is of large or moderate size, the curette easily detects the soft cancer tissue and Kelly's suggestion is of great practical value. If a small piece of typical carcinoma tissue can be secured, the diagnosis can be readily confirmed by the pathologist. As a general rule, however, specimens which consist of a small amount of curettings are less satisfactory for a pathologic examination than those which contain a considerable amount of tissue.

It may be taken as an axiom that unless the entire endometrial cavity is curetted

and all the tissue obtained is submitted to the pathologist, carcinoma cannot be positively excluded. Curettage is essential for the establishment of the diagnosis in the majority of early cases, nevertheless, it is questionable whether or not the trauma incident to the operation is not a factor in the production of metastasis and the spread of the disease by seeding of carcinoma cells through the tubes. We are all familiar with the method of production of Sampson's perforating cysts of the ovary and if we accept this theory, it is difficult to escape the idea that carcinoma cells may be disseminated in a similar manner, i. e., through the fallopian tubes.

Curettage breaks up the tumor and undoubtedly leaves small fragments loose in the endometrial cavity. More or less, uterine spasms also follow trauma to the uterine cavity. The ideal procedure is to follow the curettage by an immediate hysterectomy. This also saves the patient from the discomforts of a second operation. However, this is often inadvisable as, if only a small amount of tissue is secured by curettage, all of it should be subjected to microscopic examination.

Frozen sections are not, as a general rule, satisfactory, and it is preferable to run the tissue through by a rapid paraffin method, which ensures good histologic preparations. Irradiation combined with curettage, in suspicious cases, is therefore probably productive of the best results in this class of cases and should be followed as soon as possible by hysterectomy if cancer is demonstrated by the pathologist.

If by the office curettage, it is possible to demonstrate carcinoma, as I believe it would be in the majority of cases, the diagnosis is complete. In the face of suggestive clinical symptoms, a negative result would not, however, ensure freedom from cancer; certainly not with the same positiveness as would a thorough curettage under anesthesia.

DR. ISIDOR F. STRITTMATTER.—This is one procedure that can be done in the office, readily and safely. I use a 1 per cent lysol solution for cleaning the cervical canal, wipe out the cervix, then swab with tincture of iodine and use a curette somewhat larger than Dr. Kelly's. I have done this at least three times a day in the last fifteen years for diagnostic and treatment purposes and have not had any bad results. No patient has been detained in my office for longer than fifteen minutes after this procedure. However, a careful examination of the uterus should be made before the curettage is decided upon, to exclude a possible latent pyosalpinx or adhesions.

DR. HOWARD A. KELLY (closing).—In the average case you get enough tissue because it just pours out readily. Where a very limited area is affected, say as big as a finger tip, and I have never had reason to think that I have missed such a case, the diseased area is more friable and breaks down even under slight contact with the curette. As to the certainty of a naked eye diagnosis, where the material just pours out and you feel sure you have carcinoma, no one could have been more sure than I have been on several occasions and yet I have been mistaken, for the laboratory diagnosis was "hyperplastic endometrium." I am surer when I get irregularly, lumpy pieces broken off than I am when I secure a lot of pale, mushy material. As to the diagnosis with a pocket lens that is invaluable. Of course one does not rely on that as final. Dr. Anspach, I don't clean up the vagina half as much as you do. You clean too much; the vagina does not need the scrubbing, also the patients are shaved too often for trivial purposes. If you say Clark touches the fundus with a sound and so provokes a little hemorrhage which is suggestive of cancer, it is true that I do practically the same thing with my curette, but I have the advantage of the certainty accruing from the microscopic examination which follows. I never curette big fibroid tumors in this way.

DR. GUY L. HUNNER, Baltimore, Md., read by invitation a paper on **Ureteral Stricture in Obstetrics.** (For original article see page 47.)

#### DISCUSSION

DR. FLOYD E. KEENE.—It is about ten years ago that Hunner first called our attention to the frequency of ureteral stricture with its symptomatology and treatment. The type of stricture which Hunner describes is one which is often bilateral, is not tuberculous, is not traumatic, and owes its origin to a periureteritis, doubtless secondary to some focus of infection, such as teeth, tonsils or sinuses. Having the greatest respect for Hunner's excellent work, I have been trying for several years to demonstrate these strictures but I have been unsuccessful in doing so with the frequency which Hunner reports. It has been proved both experimentally and many times clinically that on passing a catheter up the ureter a spasm will result. In Hunner's work he uses a large catheter with a stiff stylet mounted with a large bulb of paraffin,—consequently it is my impression that what he terms a stricture might readily be a spasm of the ureter reacting to such trauma and that we cannot look upon this as a definite organic obstruction. Hunner tells us that in many of these cases there is no hydroureter above the stricture. Such a condition is very difficult for me to conceive of, in view of the fact that with an obstruction sufficient to cause symptoms and one lasting over a long period of time, one would certainly expect a dilatation of the ureter above such an obstruction and in my small series of cases I have always been able to demonstrate such a change. Hunner, by calling our attention to this pathologic entity, has opened up a field of investigation that prior to his studies had almost entirely been neglected. That ureteral strictures do exist is, of course, not open to question but from my own experience I cannot convince myself that these strictures are as commonly present as Hunner would lead us to believe.

DR. BROOKE M. ANSPACH.—I believe that one of the reasons Hunner has found stricture of the ureter more frequently than others and why he has been able to teach us so much of value in this connection, is that he uses the Kelly method of cystoscopy, which is vastly superior to any of the water cystoscopes in making the diagnosis. The Kelly cystoscope is more difficult to use, and to obtain satisfactory results one must acquire a certain amount of skill. I have had the good fortune to have associated with me, a student of Hunner's, and I have been surprised to see how easily he finds the ureter, how little he disturbs the patient, and how superior it is in the treatment of strictures and in the performance of kidney lavage, to the water cystoscope. I agree with Keene that we must be careful in saying when we have a stricture and when we have not a stricture, and I think a 11 mm. bulb is too large to draw conclusions from. Ginsberg and I have come to the conclusion that if with a bulb a little larger than a number eight catheter there is a hang upon withdrawal, a stricture almost undoubtedly exists. We have watched a number of cases very carefully, and I am convinced that real strictures of the ureter do occur oftener than we have heretofore believed. That we must be careful not to be led astray is unquestionable, and that it is possible to attribute to ureteral stricture, symptoms which really come from an abdominal condition is quite possible. For example, in a patient who had all the symptoms of ureteral stricture, including attacks of pain which seemed typically kidney crises, I removed an ovarian cyst as large as the adult head which had a twisted pedicle. Although the stricture had not been treated, there has been no recurrence of the symptoms. Here, undoubtedly, we nearly confused one condition with the other. The definite diagnosis here was not easy, for the woman was very large and heavy-set with an abdominal wall several inches thick.

In the pyelitis of pregnancy, we have all had the experience that one passage of a catheter was sufficient to stay the disease. In other words, in order to get our culture from the kidney, we opened up the ureter with the catheter, relieved the back pressure and Nature did the rest. Many of these cases require repeated passage of the catheter or, as Doctor Hunner has advised, dilatation of the point of narrowing. While, of course, the pressure of the fetal head sometimes is the predisposing cause of pyelitis during pregnancy, from stagnation of the ureteral flow; undoubtedly, the actual narrowing which Doctor Hunner has pictured sometimes plays a part. The experience of Aufhammer of Pittsburgh might seem to bear out the assumption. In more than a dozen cases he successfully treated pyelitis during pregnancy by laying a catheter into the kidney and allowing it to remain there during the latter months of pregnancy. The catheter needs irrigation occasionally and changing once in a while, but the results have been altogether especially good. The catheter in this case, permanently overcomes the narrowing or kinking of the ureter and the out-flow of urine from the kidney pelvis is free.

DR. CATHARINE MACFARLANE.—Using the Kelly cystoscope and Hunner's technic, I have been able to locate ureteral strictures in ten cases of abdominal pain of obscure origin (with or without vesical symptoms) and in three cases of pyelitis.

In each of these cases the wax bulb catheter was arrested at a definite point in the ureter time after time. After gradual dilatation up to a five mm. wax bulb, the abdominal pain and vesical symptoms (if present) disappeared and in the pyelitis cases, irrigation of the pelvis of the kidney previously fruitless, soon brought about disappearance of pus. In most of these cases extensive focal infection was found about the teeth and it was interesting to note that the patients reported temporary exacerbation of abdominal pain or urinary symptoms after each infected tooth was drawn.

DR. LEON HERMAN.—Hunner has thrown down the gauntlet to urologists, and we have taken it up right willingly, but have been unable to convince Dr. Hunner that ureteral stricture, especially in the male, is a rather rare condition.

One of the pictures thrown on the screen interested me very much; I should consider it a beautiful example of congenital valve of the ureter.

It is an interesting fact that there should be such a wide difference of opinion regarding ureteral strictures. I think it is safe to say that the vast majority of urologists are of the opinion that this is an extremely rare condition; certainly they attach much less importance to it as a clinical condition than does Hunner. We believe that inflammation of the ureter, especially at the normal points of narrowing, is commonly associated with upper urinary infection, but the ureteritis is the result of a descending infection rather than the primary lesion. We believe furthermore that the narrowing in these cases is due to rather superficial inflammatory lesions that will disappear when the pyelitis is controlled. In cases of this kind the bulb will demonstrate narrowing, especially when a large one is passed. Hunner refers to the use of the Otis explorer by urologists in the diagnosis of urethral strictures, and rightly maintains that his method as applied to the ureter is exactly the same in principle, but he fails to remark that we employ the Otis instrument only in the anterior urethra which is not encircled by sphincteric muscles. If you pass such an instrument through the external sphincter (cut-off muscle), you will be able to demonstrate narrowing in normal persons. Again, in cases of urethritis, there may be spasmodic contractions of the weak muscle fibers encircling the penile urethra so that the instrument will give the impression of organic stricturing. The same thing occurs in the ureter, for at times we not only find it impossible to pass a ureteral catheter past a given point, but our attempts are attended by anuria through reflex suppression of urinary secretion, or



perhaps the retention of urine above the spasmodically contracted ureter. The passage of a bulb through the inflamed intramural segment of the ureter will almost surely give a "hang," but does this necessarily mean stricture that has resulted from a blood-borne infection from some distant focus? I cannot conceive of a true ureteral stricture that does not cause dilatation of the ureter, and even in cases where ureteral dilatation can be demonstrated, we cannot be sure that such a condition is not the result of inflammatory weakening of the tube walls, rather than of altered mechanics incident to stricture. And finally I would take issue with Hunner regarding the value of the evidence obtained by making ureterograms with the wax-bulb catheter. It may be assumed that a large wax bulb will prevent the return flow of the injection medium and as a result the ureterogram will end at the site of the wax bulb, but I cannot believe that this evidence is conclusive of the presence of stricture. We treat a good many cases of pyelitis in pregnant women and with the most satisfactory results, merely by the indwelling ureteral catheter, sometimes supplemented by pelvic lavage, and it may be that we cure them by the incidental dilatation of ureteral strictures, but I am inclined to think that it is because of the reestablishment of urinary drainage through the relief of inflammatory occlusion at the ureteropelvic junction.

In conclusion I would say, that while we may not agree with Hunner in all of his views, we appreciate fully the fact that he has done much to stimulate interest in the important problem of upper urinary infections.

DR. HUNNER, (closing).—I am very sorry that Keene has made an earnest effort to follow out my method and fails, and is still at great variance with the results I have obtained. The only thing I have been asking all the way through in this controversy is that the urologists investigate. Now what they have apparently been doing is to sit down and think of arguments as to why I am wrong instead of getting to work and using a common sense method of trying to find an infiltration area in the ureter, just as they do in the urethra. As soon as they begin to actually investigate, if they differ from me, then as Herman has said, there is some "grave ignorance" somewhere and you will have to leave it to future generations to determine where the trouble lies. All I ask is for men to investigate this in a straightforward way and it seems very reasonable to ask them to use the bulb, because that is the method they have taught us to use in studying stricture in the male urethra. Now as to Keene's ureteral spasm argument: there is something in that. In withdrawing a bulb there is a hang not only from the organic infiltration but from the edema that arises after the catheter enters, and probably somewhat from spasm as the bulb comes through the tender inflammatory area. In partial answer to Herman, I would like to say that I do not depend upon any obstruction I get on introducing a catheter. It is perfectly reasonable to think that we get various forms of obstruction to a catheter on its introduction. We therefore say, do not attempt a diagnosis on what you seem to feel going in, but do as the urologists have taught us in urethral work and learn what the bulb says coming out. It seems to me in the spasm element the answer is, why does the spasm always take place at the same point in the individual patient? You can follow your records of repeated treatments and find that the bulb has hung, on each occasion at the same area, or if the patient has two strictures, at the same areas in the individual ureter. I cannot imagine a spasm which can hang a bulb after a patient has been under anesthesia from a half hour to two hours. In some patients whom I have treated for stricture and upon whom I have later performed an abdominal or pelvic operation, I have first passed a catheter with a bulb equal in size to the one used at the last treatment, and then after the long anesthesia and before closing the abdomen, have had an assistant withdraw the catheter. As the bulb takes up in the stricture area, the assistant grasps the catheter at the external urethral orifice in order to measure the distance. Then as the bulb drags through

the stricture area, the ureter, viewed through the abdominal incision, can be seen to straighten out across the pelvis and the measured distance from the external orifice to the point of hang of the bulb corresponds to the former measurements made with the patient conscious. It would seem that such a test done under full anesthesia would mean organic infiltration, rather than spasm. As a matter of fact I have palpated and had my assistants palpate many ureteral strictures during abdominal operations. As to the best instrument, I think the trauma with Keene's instrument in my hands would be far greater than with the Kelly cystoscope. Probably if he tried the Kelly cystoscope he would have greater trauma than with the instrument with which he is familiar. This is delicate work and one should use the instrument which he can handle best. The point Keene makes that any stricture of long duration must show in the pyelogram is perfectly true, but you have got to correctly interpret your pyeloureterogram. The case I demonstrated, showing how little change there may be after almost lifelong stricture and thirteen operations, is a very good one. We have two classes of strictures; in one, hydronephrosis and hydroureter develop and the symptoms are usually easily and quickly cured. Two or three dilatations result in a clearing of the pyelitis, the pain ceases, and the patient is well and they do not often come back. In the other type there is often a smaller pelvis than normal and the ureter shows very slight dilatation. They are the hypersensitive type, the kidney is under constant tonic contraction to overcome the pain and they probably develop more or less interstitial nephritis in the long run. You get more patients of the hypersensitive type than you do of the hydronephrosis type. They are most difficult to treat and you often have to follow them for two or three years. These are the cases that have misled the urologists into the spasm theory. Any patient that goes back to bed after passage of a plain catheter and suffers with terrible kidney colic should not be put down to spasm, try them out with the bulb. The strictured area is traumatized with even a plain catheter, it develops edema, the lumen becomes very narrow or temporarily closed and the patient has a terrible time where you least expect it. A drainage catheter may be left in indefinitely if you irrigate frequently with weak silver solution, 1:5000, or with boric acid solution. You must pay more attention to the bladder than to the kidney when you leave a catheter in. You do not need to leave the catheter in if you dilate the stricture. In the severe cases of pyelitis of pregnancy where the temperature reaches 105° F. or 106° F. it is well to leave the catheter and irrigate frequently until the temperature subsides. I rarely leave a catheter more than once. Each time you treat you dilate a little more and you don't have to leave permanent drainage. I think the pressure of the fetus in some of these cases is undoubtedly a deciding factor. I do not think they are all stricture cases. I think Herman is right in criticizing me for reporting that last case as a stricture until we have a microscopic slide. Thus far in all the cases in which we have been able to get a pathologic specimen we have demonstrated an inflammatory lesion.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

### New Books

BY ROBERT T. FRANK, A.M., M.D., F.A.C.S., DENVER, COLORADO

THE number of titles requiring review has become so large that the reader, just as happened to the reviewer, may feel somewhat bewildered. The postwar lull in medical book publishing appears to have passed.

A good illustration of how the times have changed is afforded by a volume of biography. *A Woman's Quest*<sup>1</sup> is more than the life history of Marie E. Zakreweska. It pictures the struggle for equal opportunity by women desirous of entering the medical profession. This indomitable woman emigrated to the United States after having obtained the position of chief accoucheuse at the Charité in Berlin, received her medical degree in Cleveland, at what is now Western Reserve University and eventually, after much hardship founded the New England Hospital for Women and Children. Her life is full of self-sacrifice, devotion and accomplishment. The book resembles a fascinating novel.

#### OBSTETRICS

A number of interesting books dealing with various phases of pregnancy have appeared. Obstetricians now fully recognize that gestation influences the entire organism of the mother. They therefore show an increased desire for teamwork with other specialists. The two books next to be discussed make this evident, one dealing with many of the changes encountered in gravidity, the other limiting itself to the important problem of eclampsia.

Hüssy,<sup>2</sup> with the collaboration of six others, has reviewed the relation of pregnancy to the various organ systems and also dealt with the biologic problems involved. The material covered is huge, necessarily entailing condensation and brevity. Problems of heredity, the influence of pregnancy on normal organs, nidation and placentation, toxicoses of pregnancy, internal diseases, psychoses, surgical diseases, diseases of the special senses, are some of the topics discussed. The monograph is interesting and suggestive, but too sketchy to be valued as a book of reference.

<sup>1</sup>*A Woman's Quest.* The life of Marie E. Zakrzewska, M.D. Edited by Agnes C. Vieter, M.D. D. Appleton and Co., New York, 1924.

<sup>2</sup>*Die Schwangerschaft.* In ihren Beziehungen zu den andern Gebieten der Medizin und ihre biologischen Probleme, von Paul Hüssy. Unter Mitwirkung von Chefarzt E. Bircher, Chefarzt Dr. O. Knüsel, Prosektor P. D. Dr. F. von Werdt, Kreisarzt F. Zollinger, E. Forster, Direktor W. Jost. Mit 8 teils farbigen Textabbildungen und 18 Kurven, Ferdinand Enke in Stuttgart, 1923.

Recognizing that deductive methods have lamentably failed in clearing the etiology of eclampsia, Hinselmann<sup>3</sup> has turned to inductive methods. As the problem involves almost every organ of the body he has enlisted specialists in many branches of medicine. The result of his editorial labors are this large volume containing some twelve monographs each dealing with one phase of the subject, the primary object being to record all hitherto available evidence. In spite of the size of the volume the editor admits that the treatment is far from complete or exhaustive. The pathologic anatomy has been limited to the brain, liver, kidney, placenta and fundus of the eye. He regrets that the heart, endocrine glands and other important organs, as well as metabolism could not be included, because our knowledge of their deviations from the normal in eclampsia are too little understood. Hyperplasia in the endothelium of the smaller cerebral vessels, according to Sioli, is not limited to eclampsia and cannot be used in elucidating the problem. It is tentatively suggested that the over-irritability of the vasomotor center may result from overburdening of the circulatory system. A "toxic" origin is perhaps indicated by location in the glomeruli of the kidney (cell hyperplasia). The generalization arrived at is that eclampsia occurs in gravidæ whose circulatory system is hypoplastic (minderwertig) and in whom pregnancy is accompanied by special toxic factors. No further new or definite conclusions are permissible in the present state of our knowledge. Stroganoff, in a short appendix, details his method of treatment by which he has reduced the maternal death rate to 1.7 per cent in 236 cases. De Snoo describes four cases treated with salt-free diet.

The second edition of Köhler's book<sup>4</sup> describes the treatment of puerperal infections especially as practiced in Halban's clinic in Vienna. The interior of the infected uterus is not tampered with, except when unavoidable, because of profuse hemorrhage. Hysterec-tomy is limited to necrotic myomata and uterine perforation. Diffuse puerperal peritonitis, unless the patient is moribund, is treated with incision, breaking up of adhesions, drainage, without irrigation. The operation must be performed early. Among one hundred and forty-two cases thus treated the mortality was 83.81 per cent. Ligation of the pelvic veins is of doubtful value. Much space is devoted to foreign protein injection and the various substances available for chemotherapy. Nothing approaching the contents of this monograph exists in the English language. Mosby and Company have, therefore, undertaken to publish a translation of this work of Köhler's.

Hofstätter is the author of a pamphlet, dealing with pseudocyesis.<sup>5</sup> He says that the condition is noted in the absence of both hysteria and psychosis. Several cases, due to various causes, are quoted. A short chapter is devoted to deliberate attempts to deceive by pretending pregnancy.

Turning now to a volume which covers the entire field, DeLee's

<sup>3</sup>*Die Eklampsie.* Herausgegeben von Hans Hinselmann, (with twelve collaborators). Mit 13 Tafeln und 52 Abbildungen im Text, Verlag von Friedrich Cohen in Bonn, 1924.

<sup>4</sup>*Die Therapie des Wochenbettfiebers.* Von Robert Köhler, Em. Assistenten der gynäkologischen Abteilung Krankenhaus Wieden. Zweite Vermehrte und Verbes-terte Auflage, mit 27 Abbildungen im Texte, Franz Deuticke, Leipzig-Wien, 1924.

<sup>5</sup>*Ueber eingebildete Schwangerschaften.* By R. Hofstätter, Wien, Urban and Schwarzenberg, Berlin-Wien, 1924.

Obstetrics<sup>6</sup> in my opinion is one of the two best obstetric textbooks accessible to the English reading medical public. The fourth edition shows careful revision, even in its introductory chapters, which in so many textbook revisions are subjected to neglect.

The keynote of the book is contained in the advice to the general practitioner to observe extreme conservatism, more radical measures being relegated to the hands of the hospital specialists. Unfortunately, I fear, this wholesome advice is often nullified by the fact that too few of us possess the sharp self-criticism necessary to gauge our limitations. Commendation is especially called for on "the husband" as a cause of obstetric complications, a subject which bears more extended discussion; the dictum "that attention to the child during the second stage of labor will result in a greater total saving of life than the application of all the newer methods of operative delivery," a sermon contained in a single sentence, and the conservative treatment of septic abortion.

The routine exhibition of morphine and scopolamin in the first stage of normal labor, the indications for intervention in eclampsia, episiotomy as a part of normal labor do not appeal to me.

DeLee's book is most complete, yet it remains concise, clear and readable. The volume is beautifully illustrated.

*Maternity Nursing in a Nutshell*, by Elizabeth H. Wickham, R.N.,<sup>7</sup> is a concise little book for the nurse's handbag. It contains much information, well expressed and without frills, including the "nurse's delivery" if the baby's arrival antedates that of the obstetrician.

#### GYNECOLOGY

Gynecology is well represented by a number of books which embrace the entire field or limit themselves to special subjects. The hugeness of the work edited by Halban and Seitz, *Biology and Pathology of Women*<sup>8</sup> is now becoming apparent. Volumes I and II (in 7 installments) are nearly completed, the first containing approximately 1000 pages, the second 898, and, of volume III, more than 700 pages have appeared in print. There are to be eight volumes in all.

Some of the most striking articles deal with the comparative anatomy (Schmaltz) and physiology of the domestic mammals (Keller), including the horse, cow, pig, sheep, goat, dog and cat, and also with the laboratory animals *par excellence*, the rabbit, guinea pig, rat and mouse (Drahn).

Human physiology is discussed *in extenso* by the veteran Ludwig Fraenkel, whose pioneer work on the corpus luteum is well known. An interesting chapter on anthropology is contributed by Stratz; one on heredity and eugenics by Lenz. A large amount of space is devoted to physical methods (Guthmann), shorter articles dealing with hydrotherapy (Laqueur) and psychotherapy (Walther) being added.

<sup>6</sup>*Principles and Practice of Obstetrics*. By Joseph B. DeLee, A.M., M.D., Professor of Obstetrics at the Northwestern University Medical School. Obstetrician to the Chicago Lying-in Hospital and Dispensary, and to Mercy Hospital, etc. With 1128 illustrations on 923 figures, 201 of them in colors. Fourth edition, thoroughly revised. W. B. Saunders Company, Philadelphia, 1924.

<sup>7</sup>*Maternity Nursing in A Nutshell*. By E. H. Wickham, R. N. Former Supervisor of the Maternity Department, Lebanon Hospital, New York City; late Field Nurse, Maternity Center Association, New York City, 28 illustrations, F. A. Davis, Philadelphia, 1924.

<sup>8</sup>*Biologie und Therapie des Weibes*. Herausgegeben von Josef Halban. Wien, und Ludwig Seitz, Frankfurt a. M. Lieferungen 4, 5, 6, 7, 8 and 9. Urban und Schwarzenberg, Berlin und Wien, 1924.

*The Endocrines*, written by Aschner, who has done much work in this field, covers this confused subject as well as can be hoped for. A chapter dealing with gynecologic ailments due to industrial conditions, by Max Hirsch is most welcome. Kermauner has written an excellent exposition on malformations. Reifferscheid deals with displacements. The description of operative technics on this subject leaves much to be desired. Nürnberger has contributed a long article dealing with the problem of sterility; Pankow with the subject of artificial sterilization. Schroeder completes the last installment with the pathology of menstruation.

The entire work is a monument of industry and is replete with information. It must, however, be considered an exposition of German speaking gynecology and obstetrics, because the world's literature is quite inadequately dealt with. Once more let me warn the editors that a very detailed author's and subject index is indispensable in order to make the contents readily accessible.

This is the second edition of Skeel's *Manual of Gynecology*.<sup>9</sup> The author has recognized the necessity of condensation from the medical student's point of view and, therefore, has confined his text to a smaller compass than is usual. Excellent references to the important literature encourage outside reading. Perhaps too much space is devoted to operative technic, and illustrations of operations abound.

Jellett's gynecology<sup>10</sup> is short, concise and well balanced. There is a marked discrepancy, however, between the recording of all the newer acquirements in our specialty (which are well presented) and the influence on therapy, which remains behind the times in many ways, as for example, curettage and formalin disinfection of the uterus for "endometritis"; dilatation with sea tangle tents; formalin 40 per cent in the infected puerperal uterus, etc. Many excellent, original illustrations adorn the text, but interspersed with them are highly colored, often meaningless, plates from Jolly's atlas.

Runge has written a short gynecology for the practicing physician<sup>11</sup> in the form of case histories with questions and answers. One hundred and sixty-three cases are discussed. Much attention is paid to nonoperative treatment.

The next three volumes deal with special phases of gynecology. Reynolds and Macomber's<sup>12</sup> readable little treatise on fertility and sterility contains much of interest. Involuntary sterility occurs in 10 per cent of marriages. Among ovarian disturbances, cystic ovaries and persistent corpora lutea are placed at the head. Infantilism, infection and dyspareunia are emphasized. An entire section written by E. L. Young, Jr., deals with the determining causes of sterility in the male. The most important chapters treat of "relative infertility"

<sup>9</sup>*Gynecology and Pelvic Surgery*. By Roland E. Skeel, M.D., A.M., M.S. Formerly Associate Clinical Professor of Gynecology, Medical School of Western Reserve University, Fellow of American Association of Obstetricians, etc. Second edition with 281 illustrations, P. Blakiston's Son and Co., Philadelphia, 1924.

<sup>10</sup>*A Short Practice of Gynecology*. By Henry Jellett, M.D., (Dublin University) F.R.C.P.I. Consulting Gynecologist, late Master Rotunda Hospital, Dublin; Extern Examiner in Midwifery and Gynecology, University of New Zealand; etc. Fifth edition, 318 illustrations, 10 colored plates, J. and A. Churchill, London, 1924.

<sup>11</sup>*Die Gynaekologie des Praktischen Arztes*. By Ernst Runge, Dirigierender Arzt des Wöchnerinnenheims am Urban zu Berlin (Entbindungsanstalt und Frauenklinik) Mit 60 Abbildungen im Text, Verlag von Urban und Schwarzenberg, Berlin-Wien, 1924.

<sup>12</sup>*Fertility and Sterility in Human Marriages*. By Edward Reynolds, M.D. and Donald Macomber, Boston. With a section on the *Determining Causes of Male Sterility* by Edward L. Young, Jr., M.D., Boston. Illustrated. W. B. Saunders Company, Philadelphia, 1924.

of the partners due to depressing conditions (diet). Poor spermatozoa, local uterine conditions making nidation precarious, and trauma, produce habitual abortion. Mistakes in marital habit are a frequent cause of sterility. The care of the young girl at puberty and during menstruation is prophylactically important. The final chapters deal with "the clinical conduct of the case."

The fourth edition of Bandler's well-known *Medical Gynecology*<sup>13</sup> requires no extensive review. As heretofore, several collaborators have aided with special chapters. Among them are Dannreuther, Mannheimer and Highman. It is well that occasionally a book appears which emphasizes and instructs in the nonoperative side of gynecology, a phase of our specialty in which our younger colleagues are often sadly ignorant. Most of the subjects are adequately treated. Few pathologists will agree with Dannreuther in accepting Heitzmann's criteria in the diagnosis of the site of origin of epithelial cells found in the urine. Bandler might well omit description of both intra-uterine atmocausis and galvanic application; on the other hand a description of diathermy would be useful. Redrawing of Fig. 43 with the cystoscope window pointing downward would be an improvement. As heretofore, Bandler's ideas on the endocrines must appear fanciful to the conservatives.

Pestalozza's<sup>14</sup> short monograph on genital tuberculosis, well illustrated and containing numerous case histories, states that the frequency of this localization can best be prevented by prophylaxis, care being taken to safeguard children. In every case of genital tuberculosis medical measures (iodine, serotherapy, vaccinothrapy, heliotherapy and radiotherapy) are indicated. Only when such treatment fails is exploratory laparotomy advised. The mortality of salpingectomy is 2 per cent, of the radical operation 10 per cent.

*Gynecology and Obstetrics*, volume V of the *Practical Medical Series*,<sup>15</sup> is most useful for those who like to obtain their information in highly concentrated form. The editorial comments by Watkins, De Lee and Greenhill are terse and illuminating.

#### RADIOTHERAPY

The intimate relationship of radiotherapy to our specialty is emphasized by the five books next reviewed.

The radium report of the Memorial Hospital in New York<sup>16</sup> is a most interesting document. More than half of the papers have already appeared in various journals. Of the original papers I may refer to the results obtained in lip cancers of which 69.6 per cent remained well over eighteen months, and in skin epitheliomas of which 95 per cent regressed clinically. Tongue and tonsil growths give good results, while rectal cancer has a poor outcome, quite similar to the results

<sup>13</sup>*Medical Gynecology*. By Samuel Wyllis Bandler, M.D., Fellow of the American Association of Obstetricians and Gynecologists; Professor of Gynecology, New York Post-Graduate Medical School and Hospital, etc. Fourth Edition. With original illustrations. W. B. Saunders Company, Philadelphia, 1924.

<sup>14</sup>*La Tuberculosis Genitale Nella Donna*. By Prof. Ernesto Pestalozza, Direttore della Clinica ostetrico-ginecologica della R. Università di Roma. Libreria Di Scienze E. Lettere, Roma, 19-20 1924.

<sup>15</sup>*The Practical Medicine Series*. Volume v, *Gynecology*, Edited by Thomas J. Watkins, M.D., F.A.C.S., *Obstetrics*, Edited by Joseph B. De Lee, A.M., M.D., with the Collaboration of J. P. Greenhill, B.S., M.D., The Year Book Publishers, Chicago, Series 1923.

<sup>16</sup>*Radium Report of the Memorial Hospital*. New York, (Second Series, 1923). Octavo, 305 pages, 55 illustrations: Paul B. Hoeber, Inc., New York City, 1923.

obtained by surgery. Six hundred cases of uterine carcinoma have been treated, the results since 1918 showing distinct improvement. In primary cancer of the breast, surgery and radiation are indicated. Far advanced cases of malignancy are rendered worse by radiation. The report proves that radiotherapy is an important new development which promises further advance.

Wintz has written two important monographs dealing with the technic of roentgen treatment of cancer of the uterus<sup>17</sup> and of cancer of the breast.<sup>18</sup>

For uterine cancer 100-110 per cent S.E.D. is essential to kill the cancer cells. The further course depends on biologic factors (resistance, etc.). Eighty per cent of cases show local healing; in fifteen per cent an ulcer persists; in a few a pelvic phlegmon develops. The treatment of five to five and one-half hours of exposure must be given within two to two and one-half days, using six or seven ports of entry. A white blood count below 2500, as well as hemoglobin percentage below forty to thirty absolutely contraindicates raying. By means of diaphoresis, copper is deposited in the tumor before exposure. Excellent illustrations explain the text.

Mammary cancer,<sup>18</sup> on the other hand, is a debatable field. Wintz describes his own technic, after pointing out that the large area, the shallow depth, the impossibility of employing cross fire complicate the treatment. He also rays the ovaries. The numerous photographs elucidate his description. These two monographs form a valuable addition to our technical library.

Holzknacht<sup>19</sup> reviews the most modern achievements of deep x-ray therapy in nine lectures, of which five have previously appeared in print. He is a believer in repeated moderate dosage even in the treatment of cancer. In cancer he does not believe that there is a stimulating dose.

A short, nontechnical pamphlet by Martius<sup>20</sup> contains a description of the x-ray apparatus used by the modern radiologist.

#### ENDOCRINOLOGY

Another special field which has aroused great, at times too great, enthusiasm among gynecologists is that of endocrinology. The first two books to be mentioned are conceived in a laudably objective vein. Aschner<sup>21</sup> has devoted an entire volume of five hundred pages, not to women's diseases but the "sick woman." Habitus, general constitutional diseases and dyscrasias are discussed. Individuals are classified into types, a method unconsciously employed by every good clinician who bases his therapeutics upon the individual as well as upon the disease to be dealt with.

<sup>17</sup>*Die Roentgenbehandlung des Uteruskarzinoms.* By Hermann Wintz O. Professor, Direktor der Universitäts-Frauenklinik Erlangen, 50 Lichtdrucktafeln, Georg Thieme, Leipzig, 1924.

<sup>18</sup>*Die Roentgenbehandlung des Mammakarzinoms.* By Hermann Wintz, O. Professor, Direktor der Universitäts-Frauenklinik Erlangen, 4 Abbildungen und 82 Lichtdrucktafeln, Georg Thieme, Leipzig, 1924.

<sup>19</sup>*Roentgentherapie.* Neun Vortraege von G. Holzknacht, Professor an der Wiener Universitaet, etc. etc. Urban und Schwarzenberg, Berlin, 1924.

<sup>20</sup>*Handbuch der Gesamten Medizinischen Anwendungen der Elektrizitaet, einschliesslich der Röntgenlehre, in drei Bänden.* By Heinrich Martius, Band III, Lieferung 1: 51 Abbildungen im Text, Werner Klinkhardt, Leipzig, 1922.

<sup>21</sup>*Die Konstitution des Weibes.* Von Dr. Bernhard Aschner, Privatdozent an der Universitaet Wien. Erster Band. Allgemeine Konstitutionslehre. Verlag J. F. Bergmann, Muenchen, 1924.



The main contents is divided into: basis of constitution (sex, complexion, temperament, tonus, dimensions, etc.), theory, constitutional anomalies and diseases (asthenia and enteroptosis, infantilism, etc.), endocrine diseases, diseases of the hematopoietic and lymphatic systems, disturbances of metabolism and nerves, neoplasms and malformations. The book is an earnest and scholarly contribution to one of the newest and least understood phases of modern medicine. Many of the opinions will, doubtless, require modification but no one can read this book without deriving stimulation and profit from its pages.

Zondek<sup>22</sup> has written a very acceptable book dealing with the clinical manifestations of endocrine disease. He places the endocrine (chemical) system on a par with the nervous system. Eighteen complexes are graphically described, of which four are due to thyroid and five to pituitary disturbances. Much attention has been devoted to metabolic changes. Osteomalacia is included as a disease of the internal secretory organs. Many excellent photographs of rare and interesting cases are reproduced.

Dercum's *Biology of the Internal Secretions*<sup>23</sup> is an interesting generalization, well written, showing much thought and knowledge, but is based largely on a hypothetical foundation. The "all important function of the thymus" has yet to be established. The chapters on the endocrine factor in nervous and mental diseases are interesting. The explanation offered for the cause of malignancy resembles somewhat the "Entdifferentzierung" of v. Hansemann and has no direct bearing on the internal secretions. The book is well worth reading, with mental reservations on the soundness of its speculation.

Timme's *Lectures on Endocrinology*<sup>24</sup> consist of an unaltered reprint of an article appearing in 1921. It is typical of the "clinical" endocrinology current today, which owes its birth to lack of patience in waiting for facts, and in the interim bolsters the gaps with plausible hypotheses. We instance the statements that the thymus secretes a substance which has vagotonic properties, that pineal subinvolution and precocious pineal involution produce syndromes, all of which are purely hypothetic conclusions.

#### MISCELLANEOUS

A number of books will now be discussed which, though not strictly belonging to our field, are important, instructive or interesting to every physician who desires to keep abreast of the advance in knowledge. The second edition of Cabot's *Modern Urology*<sup>25</sup> is of much interest to the gynecologist. The treatment of bladder, ureteral and kidney conditions is in many ways identical in the two sexes. Lesions of the external genitalia dealt with, which interest us, include syphilis, chancroid and inguinal granuloma. We disagree with Corbus who

<sup>22</sup>Die Krankheiten der Endokrinen Druesen. Ein Lehrbuch für Studierende und Aertzte. Von Herman Zondek, 173 illustrations, Berlin, Julius Springer, 1923.

<sup>23</sup>The Biology of the Internal Secretions. By Francis X. Dercum, M.D., Ph.D. Professor of Nervous and Mental Diseases in the Jefferson Medical College; Member of the American Philosophical Society; Member of the Academy of Natural Sciences of Philadelphia. W. B. Saunders Company, Philadelphia and London, 1924.

<sup>24</sup>Lectures on Endocrinology. By Walter Timme, M.D., Attending Neurologist, Neurological Institute, New York. Paul B. Hoeber, New York, 1924.

<sup>25</sup>Modern Urology. By Hugh Cabot, M.D., C.M.G., F.A.C.S., Dean and Professor of Surgery in the Medical School of the University of Michigan, Ann Arbor, Michigan, Second Edition, thoroughly revised; illustrated with 398 engravings and 11 plates, Lea and Febiger, Philadelphia and New York, 1924. vols. 1 and 2.

classifies all cases of esthiomene under syphiloma vulvae. That dyspareunia is not infrequently due to tender ureters according to Hunner, is worth keeping in mind, but probably not as frequent as this author implies. Vesicovaginal fistula appears to have been overlooked.

This American textbook is of as much value to the gynecologist as to the genitourinary specialist for whom it was primarily intended. The smooth and continuous text, from twenty-seven well-known contributors, gives evidence of careful editorial supervision.

Mummery's<sup>26</sup> is a personal book giving an exposition of the author's own viewpoint and experience. To me the subjective element adds to its value as it is based on more than twenty years of experience. The present volume represents a combination of two previous monographs, one dealing with the rectum, the other with the colon. The author uses spinal, regional or local anesthesia combined with nitrous oxide-oxygen sequence or with twilight sleep. He devotes much attention to the commoner conditions such as colitis, hemorrhoids, fissure and fistula. In the latter disease Mummery does not practice division of the sphincter ani routinely. Diverticulitis is a fatal ailment showing a mortality of 70 per cent. His judgment of colonic stasis is commendably conservative. The author appears to consider recto- and sigmoidopexies valuable in prolapse. The book is excellent.

For the specialist interested in possessing a very complete reference guide on anesthesia the second edition of Gwathmey's treatise<sup>27</sup> will be welcome. It covers every detail including the history, physiology and chemistry of anesthetics. The special technics and the indications for choosing a given anesthetic are fully discussed. Local anesthesia, spinal analgesia and anesthesia, intravenous, synergist (including magnesium sulphate and painless childbirth) anesthesia, the new ethylene, medicolegal aspects are some of the main subjects dealt with in a clear and adequate fashion.

Designed for a larger circle of readers, Webster<sup>28</sup> has published a short manual for the medical student and physician in general practice, in other words, for the occasional anesthetist. The ground is completely covered, including the newest anesthetic, ethylene, and the special field of local anesthesia.

Barker's translation of Siemen's scholarly book on race hygiene and heredity<sup>29</sup> is well worth reading. A simple, clear-cut review of the teachings of Lamarck, Darwin, Vilmorin, Weissman, Mendel, etc., is presented. The part played by selection and variation is shown. Inbreeding often elevates. The decay of ancient civilizations was due to lack of care in maintaining sufficient fertility among the capable. The racial hygiene of today should consist in an attempt to arrest the

<sup>26</sup>*Diseases of the Rectum and Colon and their Surgical Treatment.* By P. Lockhart-Mummery, F.R.C.S. Eng. M.A., M.B., B. C. Cantab, Senior Surgeon to St. Mark's Hospital for Cancer, Fistula, and other Diseases of the Rectum, etc., William Wood and Company, New York, 1923.

<sup>27</sup>*Anesthesia.* By James Tayloe Gwathmey, anesthetist to New York, Cancer, and Peoples' Hospitals, etc. With collaboration on special subjects. Illustrated. Second revised edition. The Macmillan Co. New York, 1924.

<sup>28</sup>*The Science and Art of Anesthesia.* By Colonel William Webster, D.S.O., M.D., C.M., Professor of Anesthesiology, University of Manitoba Medical School; Chief Anesthetist, Winnipeg General Hospital; Illustrated, C. V. Mosby Company, St. Louis, 1924.

<sup>29</sup>*Race Hygiene and Heredity.* By Hermann W. Siemens, M.D. Translated and edited by Lewellys F. Barker, M.D., Illustrated. D. Appleton and Company, New York, 1924.

dying out of the socially higher classes by restricting undesirable emigration, by selective taxation, enlightenment, etc.

The first edition of Tandler's topographic anatomy of emergency operations<sup>30</sup> was published for the benefit of military surgeons during the World War. The present edition covers the entire human body except the female genital organs. In ten lectures he deals with the surgery of the heart and great vessels, the respiratory apparatus, digestive tract and urogenital system. Superb, yet simple drawings in color, based on fine dissections, lend to this small volume the value of an atlas.

Two monographs from the *Bibliothèque du Cancer* interest the gynecologist greatly. Okinczyc<sup>31</sup> described cancer of the intestine. The literature, beyond the year 1921, does not appear to have been utilized, except in the very complete section on operative technic.

The second monograph is that of Lecène and Wolf fromm on cancer of the kidney, suprarenal capsule, upper urinary tract and solid paranephritic tumors.<sup>32</sup> Both volumes are well got up and nicely illustrated.

The third edition of Roussy and Bertrand's epitomé of pathologic histology<sup>33</sup> has just appeared. The second edition was translated into English by MacFarland. Originally designed as a quiz compend, the sterling worth of the book has given it a unique position. Compressed into fourteen lectures, one page of text with a corresponding high and low power illustration on the opposite page, the entire body, including the endocrine glands, has been covered in the small compass of 259 pages. This is a wonderful little book of equal value to student and teacher.

The seventh and eighth edition of Kaufmann's textbook of pathology<sup>34</sup> has again brought this classic up to date. For many reasons Kaufmann's pathology has always appeared to me the most useful and instructive of its kind. For years I have always kept it at my elbow, and almost never has it failed me as a book of reference. The immense amount of information compressed within its 1,962 pages is difficult to realize. Although written largely in the form of an epitome the text is most readable. The viewpoint of the clinician is always kept in mind. Differential diagnosis, both gross and microscopic is emphasized. Brief interpolations in the literary references epitomize the gist of long articles in a single sentence. Even the short legends accompanying the illustrations are exceptionally instructive. The two hundred pages devoted to gynecologic, obstetric and mammary conditions cover this field most adequately. This book should, long since, have been translated into the English language.

<sup>30</sup>Topographische Anatomie Dringlicher Operationen. By J. Tandler, O. Ö. Professor der Anatomie an der Universität Wien, Zweite, verbesserte Auflage mit 56 zum grossen Teil farbigen Abbildungen im Text, Verlag von Julius Springer, Berlin, 1923.

<sup>31</sup>Bibliothèque du Cancer de L'Intestin.. By J. Okinczyc. Professeur agrégé à la Faculté de Médecine de Paris, Chirurgien des Hopitaux, 78 figures dans le texte. Gaston Doin, Paris, 1923.

<sup>32</sup>Bibliothèque du Cancer, Cancers du Rein. By P. Lecène et G. Wolf fromm, 32 figures dans le texte, Gaston Doin, Paris, 1923.

<sup>33</sup>Travaux Pratiques D'Anatomie Pathologique. Quatorze seances de lectures de coupes microscopiques. Par Gustave Roussy, et Ivan Bertrand. Préface du professeur Pierre Marie. Troisième édition. Messon et Cie. Editeurs. Paris, 1924.

<sup>34</sup>Lehrbuch der Speziellen Pathologischen Anatomie, für Studierende und Aerzte, von Eduard Kaufmann, Siebente und Achte völlig neu bearbeitete und vermehrte Auflage, Vereinigung Wissenschaftlicher Verleger. Walter De Gruyter & Co. Berlin-Leipzig, 1922. Volumes one and two.

The tenth edition of Hammarsten's standard textbook of physiologic chemistry<sup>35</sup> is an unaltered reprinting of the previous edition published in 1921. This book continues to be the most useful reference handbook dealing with physiologic chemistry, because of its encyclopedic completeness, careful arrangement and marginal index. It is a valuable guide to the widely scattered literature and sufficiently simple to be comprehensible to the physician who still remembers the elements of chemistry.

Hedin, Johansson and Thunberg have collaborated by writing special chapters. Hedin is the author of the introductory chapter, dealing mainly with physical chemistry, and has also covered the subject of the carbohydrates, digestion and the organs of procreation. Thunberg discusses respiration and oxidation. Johansson takes up metabolism, the rest of the volume being from the pen of the senior author.

Volume III of the surgical anatomy and pathology written by Duval, Jeanbrau, Gosset and Lecène<sup>36</sup> describes in detail the diseases of the breast, liver and gall bladder, spleen, pancreas, intestine, peritoneum and genital apparatus of the male. The exposition is sane and sound, the numerous illustrations are fair. No bibliography is appended. When I mention as an example that Bloodgood's work on chronic mastitis is not referred to, nor Handley's researches in mammary cancer, the English speaking reader will realize that the book offers but little appeal to him.

Otfried Müller assisted by Weiss, Niekau and Parrisius<sup>37</sup> has published a marvelous atlas with colored plates showing the capillaries of the human body surface in health and disease. The text enters fully into what is known of this important division of the circulatory apparatus which harbors only about 200 c.c. of blood, or only one-twenty-fifth or one-thirtieth of the blood volume, yet is of utmost importance to every cell in the organism. Technic, armamentarium and findings are described in greatest detail making of this atlas a valuable and basic contribution to the study of the circulation.

Volume two of the 1924 International Clinics<sup>38</sup> contains a symposium of physiotherapy. Brooke aborts coryza by vibration between seventh cervical and first dorsal vertebra. Caudal anesthesia in urology is dealt with by Haines, Mumey and Faber. Balfour and Flynn cover advances in surgery. The tide has turned somewhat against cholecystectomy in obstructive conditions of the common bile duct. Lugol's solution has relieved 37 per cent of exophthalmic goiter cases and reduces the operative mortality in those requiring surgery. Brickner describes affections of the shoulder. There are seventeen other articles dealing with a variety of topics.

<sup>35</sup>*Lehrbuch der Physiologischen Chemie*, Unter Mitwirkung von Prof. S. G. Hedin in Upsala, Prof. J. E. Johansson in Stockholm und Prof. T. Thunberg in Lund, Herausgegeben von Olof Hammarsten, Zehnte unveränderte Auflage, J. F. Bergmann, München, 1923.

<sup>36</sup>*Precis de Pathologie Chirurgicale*. Tome III. Glandes mammaires, abdomen, appareil génital de l'homme. Par Pierre Duval, E. Jeanbrau, A. Gosset, P. Lecène et Ch. Lenormant. Quatrième édition. Masson et Cie. Editeurs, Paris, 1924.

<sup>37</sup>*Die Kapillaren der Menschlichen Körperoberfläche*, in Gesunden und Kranken Tagen, In Gemeinschaft mit den Privatdozenten und Assistenzärzten der Klinik Herren Dr. Eugen Weis (z. Z. Regierungsmedizinrat und leitender Arzt am Versorgungskrankenhaus in Heilbronn), Bruno Niekau und Walter Parrisius, dargestellt von Professor Otfried Müller, mit 187 farbigen Abbildungen auf 20 Tafeln und 28 Textabbildungen, Ferdinand Enke, Stuttgart, 1922.

<sup>38</sup>*International Clinics*. A Quarterly of illustrated clinical lectures and especially prepared original articles. Edited by Henry W. Cattell, A.M., M.D., Philadelphia. Volume II. Thirty-fourth Series, 1924. J. B. Lippincott Co., Philadelphia, 1924.

Hofstätter devotes an entire volume to the *Woman Who Smokes*.<sup>39</sup> He considers the habit one manifestation of epicurean sensuality due to the desire to overcome depression, a form of narcotomania akin to alcoholism, morphinism and the cocain habit. "The cigarette is an awful temptress for our young people; it leads the way to all depravity." Those interested may read this medical tract.

Four additional booklets, published under the auspices of the National Health Series, have reached me. Their titles are: *Your Mind and You*, by George K. Pratt, M.D.; *Adolescence*, by Maurice A. Bigelow, Ph.D.; *Health of the Worker*, by Lee K. Frankel, Ph.D.; *Exercises for Health*, by Lenna L. Meanes, M.D. Like the preceding fourteen volumes these are written by well-recognized authorities on the four different fields touched upon.

## Selected Abstracts

### Birth Injuries of the Newborn

Holland: Cranial Stress in the Fetus During Labor and on the Effects of Excessive Stress on the Intracranial Contents. *Journal of Obstetrics and Gynaecology of the British Empire*, 1922, xxix, 531.

Holland found tears in the dura mater septa in 81 out of 167 fetuses dying during labor. A small percentage of the injuries occurred in normal labors. Thirty-five of the eighty-one were either breech or version cases. Bilateral lacerations of the tentorium cerebelli occurred sixty-four times.

During labor the fetal head is subjected to a cranial stress composed of both general and simple longitudinal compression. The latter is the most important in its effects on the cranium and intracranial contents. Excessive stress results in excessive moulding, over-stretching and tearing of the tentorium and falx cerebri and in the rupture of certain blood vessels. The attachments of the septa of the dura mater tend to limit and prevent excessive moulding. When tears of the septa occur the most common site is in the falx cerebelli near its junction with the falx cerebri. Due to its fixed attachment, changes in the septa are frequently transmitted to the vein of Galen, resulting usually in rupture of one of its tributaries and subdural hemorrhage. Subdural hemorrhage of greater or less degree was found in all but six of the author's eighty-one cases. Due to the increase in the anteroposterior diameter of the fetal head, lacerations of the falx cerebri are common in brow and face presentations. The high percentage of cerebral hemorrhage and tentorial lacerations seen following complicated breech labors results from the rapid compression of the aftercoming head.

The location of a cerebral hemorrhage is usually more important than its size. A small hemorrhage confined beneath the tentorium is frequently more serious than a larger one above. Actual tears of the tentorium are not in themselves a cause of death. In the absence of severe hemorrhage there is no doubt that many infants survive the original strain and grow up none the worse for lacerations of the tentorium. While forceps delivery saves many babies, the

<sup>39</sup>Die Rauchende Frau. Eine klinische, psychologische und soziale Studie. Von Dr. R. Hofstaetter, Privatdozent fuer Geburtshilfe und Gynaekologie in Wien. Verlag von Hoeelder-Pichler-Tempsky. Wien—Leipzig, 1924.

injudicious use of instruments is the cause of many needless fetal deaths. Twenty-five of forty-four vertex cases with fatal lacerations of the tentorium were delivered by forceps.

H. W. SHUTTER.

**Capon:** Intracranial Traumata in the Newborn. *Journal of Obstetrics and Gynaecology of the British Empire*, 1922, xxix, 572.

The important factors in safeguarding the life of the fetus during labor are: The mobility of the bones of the cranial vault, the presence of membranous fontanelles and sutures, and the low excitability of the fetal respiratory center preventing premature respiration. Prematurity and a tendency to hemorrhage predispose to intracranial injury. Excessive moulding, particularly when rapid, is the most common direct cause of such traumata. Intracranial congestion, edema, increased tension and hemorrhage may occur in normal labor and almost always accompany contusions and lacerations of the dural septa when excessive moulding has occurred. When increased intracranial pressure is produced the accompanying depression of the respiratory center frequently makes artificial stimulation of little avail after birth. Venous congestion of the fetal brain and meninges produced in a normal labor may be equally as serious as the larger subdural hemorrhages. Intracranial hemorrhage usually occurs either from the small tentorial vessels, the vein of Galen or the cerebral veins near their termination in the superior longitudinal sinus. Hemorrhage of the internal cerebral veins and sinuses is rare.

The diagnosis of intracranial injury rests on the history and the external evidence of cranial stress, such as scalp injuries, caput succedaneum, excessive moulding, fractures and depressions, bluish asphyxia and nervous symptoms. The disinclination to nurse, shallow respiration, slow, full pulse are symptoms frequently present. The nervous symptoms are central when the hemorrhage is above the tentorium and are of value when a localized hematoma is present. Yawning, sighing, nystagmus, muscle spasm and ocular palsies may be present. Convulsions usually signify a hemorrhage of cortical origin. The bulging fontanelle may be either an early or late finding. Convulsions, Cheyne-Stokes' respirations and the loss of reflexes are usually late symptoms. Cyanosis, twitchings, convulsions and bulging of the anterior fontanelle carry a bad prognosis which, however, improves after the fifth day. Paralysis and pathologic mental states are not uncommon sequelae in cases recovering.

Early lumbar puncture is indicated in all suspected cases and is apparently without danger. It is most efficacious when convulsions coexist or when the cerebral lesion is only due to congestion. The fluid withdrawn early resembles whole blood, later it clarifies. In the treatment of these injuries rest and the maintenance of body temperature and nutrition is important. Human and horse serum help to control further hemorrhage. Since hemorrhage occurring during labor is more frequently diffused than local, surgical intervention seems contraindicated in the majority of cases.

H. W. SHUTTER.

**Cameron:** Intracranial Birth Injuries. *Lancet*, 1923, ccv, 1292.

The immediate symptoms of large subdural hematoma, above or below the tentorium or in both situations, are fairly definite. Tense bulging of the fontanelle is clear evidence of increased intracranial tension. Pressure upon the fontanelle in such cases produces respiratory distress, screaming or even convulsions. The cerebrospinal fluid is often under increased pressure, and in most cases contains blood. About sixty per cent of the cases show retinal hemorrhages and at times,

edema of the disc. Inequality of the pupils, squinting and nystagmus are common. Extreme restlessness, constant screaming or sometimes stupor and immobility are exhibited. The increased tone of the muscles is very striking in most cases. Impairment of the sucking and breathing reflexes indicate most clearly the seriousness of the condition. Suction may not only be poor and clumsy but the reflex may be entirely absent.

Many of these conditions are overlooked during early infancy. It is only when the hemorrhage has affected those vital medullary reflexes which are active from the first that the child is brought for examination early.

These cases may be inaccurately classed as mental inferiors. A close observation, however, will often afford convincing proof of the activity of the brain in spite of the expressionless face and immobile helpless limbs. Memory, artistic perception, esthetic sense, imagination and character may all be on a high plane. At the worst, personality is not debased as in primary mental defects. The idiot is known by what it does, these children only by what they cannot do.

NORMAN F. MILLER.

**Ballance and Ballance:** Intracranial Hemorrhage in the Newborn. *Lancet*, 1922, cciii, 1109.

The authors report a case of intracranial hemorrhage in the newborn as a preface to some general observation on fractures of the skull of infants.

Labor was slow and prolonged. The delivery was effected by forceps but with difficulty. The child was born in a state of asphyxia. During the first two days the child was continually crying. On the third day a long screaming fit occurred, and, following this, an enlarged soft swelling was observed on the right side of the head. On the fourteenth day the child was operated upon and about two ounces of dark blood removed, and a broken fragment of the frontal bone exposed and removed. The baby made a good recovery.

Prompt operation is advocated, not only to obviate impending death, but also in case of recovery to anticipate and prevent paralysis, amentia, epilepsy, etc.

The various types of fractures are mentioned and illustrated by appropriate case reports from literature.

The writers believe that infants bear operations well, if carried out with the greatest gentleness and with every effort to prevent the loss of blood.

NORMAN F. MILLER.

**Ehrenfest, H.:** The Causation of Intracranial Hemorrhages in the Newborn. *American Journal of Diseases of Children*, 1923, xxvi, 503.

An understanding of the causation of intracranial birth hemorrhages, while important for diagnosis and treatment, is essential for the far more urgent problem of their prevention. The question of prophylaxis concerns most of all the obstetrician. It seems that obstetricians have succeeded in revealing the exact mechanism of the origin of these injuries.

Compression of the head in any one direction results in the shortening of the diameter lying in the direction of the pressure, and a compensatory lengthening of the diameter perpendicular to the one reduced. The longitudinal arrangement of the fibers in the falx and their lateral extension on either side into the tentorium indicates that it is the chief mechanical task of the falx to prevent an abnormal extension of the long diameters of the cranium, and thus to counteract during moulding the effect of lateral compression. But sudden or excessive compression in either lateral or longitudinal direction, by raising the falx, may cause

fibers to tear at the point where the falx fibers diverge to form the upper blade of the tentorium. The effect of the tear on the infant in the main is determined by the hemorrhage resulting from it. Hemorrhage and size of hematoma therefore depend on whether any vessels are torn and whether they are small or large. Asphyxiation enters into the problem of the etiology of these hemorrhages, solely as a predisposing or contributory but never as a direct cause, only in so far as an engorged vessel is more likely to tear and to discharge a larger amount of blood. Here also enters still another etiologic factor, again solely as contributory but not as direct cause, namely hemorrhagic diathesis. In the presence of this condition even a very small vessel gradually will permit the escape of a dangerously large amount of blood.

We have in the causation of intracranial hemorrhages to differentiate between the direct mechanical causes and certain predisposing and contributory factors. Such a grouping does not in the least detract from its value as an aid in diagnosis and treatment but unquestionably is of greater advantage in the problem of prevention. Emphasis properly belongs to these primarily mechanical factors which cause intracranial structures to be crushed or torn, with more or less hemorrhage resulting from the injuries as determined by other factors. The frequency with which such injuries involve more than one structure (as illustrated by the writer in a few cases he describes) well accounts for the perplexing symptomatology and the futility of surgical interference in many of the cases.

GROVER LIESE.

**Siegmund, H.: Birth Injuries to the Brain and Their Consequent Results.**  
*Münchener Medizinische Wochenschrift*, 1923, lxx, 137.

In all birth injuries the vascular system is the one most affected as far as cerebral injuries are concerned. Mechanical injury and tearing of small vessels results in circulatory disturbance; injury to vessel walls, leads to diapedesis of red cells, impairment of nourishment and to establishing of areas of softening. The development of cysts, sclerosis, porencephaly, and even necrosis may follow in these foci of impaired circulation. Within the first six months of life especially in the premature children we may find evidence of cicatricial softening. External hydrocephalus may come from subdural bleeding while internal hydrocephalus may result from cerebral bleeding. The so-called encephalodystrophia or fatty degeneration of the neuroglia probably arises from cerebral hemorrhage, secondary to birth trauma. In many postmortem examinations of newborn children one cannot fail to be impressed with the hyperemia of brain substance and meninges, and probably many of the deaths of infants are due to small hemorrhages and a diapedesis occurring as a result of birth trauma.

A. C. WILLIAMSON.

**Kelly, G. F.: Intracranial Hemorrhage in Newborn.** *Wisconsin Medical Journal*, 1924, xxiii, 16.

The author reports two cases of intracranial hemorrhage in the newborn. The first case was a breech delivery without instrumental assistance. The head of the child was large with separated fontanelles, and it had a spina bifida in lower dorsal and lumbar regions. The child was admitted to the hospital five hours after delivery for possible surgical treatment of the spina bifida. The condition of the baby was not good during its stay in the hospital. Intracranial hemorrhage was not suspected. It died at the end of nine days. Autopsy showed subdural hemorrhage with hydrocephalus.



The second case was a baby, twenty-two days old. The labor was prolonged and very difficult with instrumental assistance and under general anesthesia. When two weeks old it developed convulsions which became general and continued for several days. There was almost constant twitching of face, arms and legs. Feeding was difficult and vomiting was frequent. The infant lived six weeks after entering hospital. Diagnosis was intracranial hemorrhage, but no autopsy was allowed.

F. J. SOUBA.

Saenger, H.: The Origin of Intracranial Hemorrhages in the Newborn. *Monatsschrift für Geburtshilfe und Gynaekologie*, 1924, lxxv, 258.

The author studied 100 newborn babies upon which autopsies had been performed. Twenty-seven of these showed no macroscopic intracranial bleeding and no tentorial laceration, twenty-seven had mild cerebral hemorrhage and forty-six had extensive cerebral hemorrhage. Six of these babies had been delivered by cesarean section, but three were premature.

No mechanism of labor is as dangerous to the child as the delivery of the aftercoming head. Of twenty-three children delivered feet first that came to autopsy, only three failed to show tentorial lacerations and only one failed to show intracranial hemorrhage. If the aftercoming head is easily delivered by nature there is no damage, but if dystocia arises there are marked circulatory disturbances which are intensified by the external stimulation of the skin (cooling). Both brain and heart receive an increased blood supply. The forceps are the best means of replacing the *vis a tergo* and of preventing too great distention of the skull in a vertical direction. If instead of a forceps, strong traction is made on the body from below there results an enormous hyperemia of the head. The sinuses become filled with blood and the dural duplications, the falx cerebri and the tentorium cerebelli become enormously stretched. Traction on the neck, mouth and jaw increase the vertical diameter of the skull. Hence the dura and with it the falx cerebri suddenly tear and the laceration in the latter extends on to the tentorium. The author goes so far as to say that in every delivery by the Wiegand-Martin or Smellie-Veit maneuver if more is required than simple rotation and extraction, tentorial tears result.

Thirteen cases of this series showed hemorrhage after forceps operation. In nearly all these cases the forceps marks indicated that instead of a biparietal application an oblique or an anteroposterior application had been used. As regards intracranial hemorrhage, the Kielland forceps are the least harmful, for in all the cases where the Kielland forceps alone were used not one case of intracranial hemorrhage was found by the author. But intracranial hemorrhage undoubtedly does occur with the Kielland forceps, for hemorrhages are even found after spontaneous deliveries in normal pelvis. In this series thirteen cases of hemorrhage were found after spontaneous delivery.

Of the forty-six cases of severe hemorrhage all but three showed lacerations of the tentorium. By the injection method which the author used he demonstrated that the greatest portion of the free blood came from tears in branches of the tentorial veins. These veins have no muscularis or elastic fibers. The cerebral veins, on the other hand, possess the power of contractility and so may check hemorrhage. Tears in the large internal cerebral veins lead to hemorrhages into the ventricles and such hemorrhages are found essentially in premature babies. Large hemorrhages into the brain substance itself were never found.

Thirty-four of the babies were born without any signs of life and nearly all showed mucus, meconium and vernix in the bronchi indicating premature aspiration. In twenty-four the heart was beating at the time of birth.

J. P. GREENHILL.

**Sharpe: Intracranial Hemorrhage in the Newborn.** *Journal American Medical Association*, 1923, lxxxi, 620.

Sharpe writes on the advisability of an early diagnosis of intracranial hemorrhage in the newborn and the value of treatment in the acute stage. He uses lumbar puncture both as a diagnostic and curative measure. In an examination of 100 consecutive newborn children, he found free blood in the cerebrospinal fluid in nine cases. No untoward effects on the baby were observed from the lumbar puncture. In another series of forty-eight newborn babies with a diagnosis of a serious intracranial lesion, following a very difficult labor with and without the use of instruments, lumbar puncture was performed on all but two, and free blood was obtained in the cerebrospinal fluid of 87 per cent during the first week after birth. During the second week and especially later, the lumbar puncture was less valuable as a diagnostic aid. In four of the milder cases repeated lumbar puncture was done, and in two, the condition cleared up. The operative and postmortem findings in 100 per cent of these acute extreme cases disclosed subdural, supracortical, and subarachnoid hemorrhage of varying degree. He states that lumbar puncture both as a diagnostic and as a therapeutic measure should be done in every suspected case of intracranial lesion of the newborn.

W. KERWIN.

**Cruickshank: The Hemorrhages of the Newborn.** *The Lancet*, 1923, cciv, 836.

The writer's study is based on 400 infants, 200 of which were mature and 200 premature cases.

He considers first the hemorrhagic diatheses of the newborn. These are to be distinguished from, first, the true birth hemorrhages and secondly from the hemophiliacs. The commonest manifestations of these spontaneous hemorrhages, which he groups together under the name of hemorrhagic diathesis, are bleeding from the gastrointestinal tract, bleeding into the skin, bleeding from the umbilical cord and late bleeding into the suprarenals and other viscera.

The second group considered is entirely separate from the various forms mentioned under hemorrhagic diathesis and includes prenatal, intranatal and neonatal asphyxia as well as those of intranatal traumatic origin.

In the series of 200 infants, hemorrhage of greater or lesser degree was present in 154 cases, or 77 per cent. Of this number, in fifty-five cases the hemorrhage consisted only of capillary oozing, and if these be neglected there would be a gross hemorrhage in ninety-nine cases, approximately 50 per cent of the series.

Two hundred premature infants were studied, born during the eighth to ninth lunar months of pregnancy. It was found that in 133 cases hemorrhage was present. In fifty-two of the premature infants the bleeding did not amount to more than a capillary oozing so that the gross hemorrhage in premature cases occurred in eighty-one cases, approximately 40 per cent of the whole.

It is interesting to note that the incidence of tentorial tears was practically the same in the two groups.

Where a tentorial tear occurred in a mature infant, it was found that in 79 per cent of these cases, the labor was abnormally long, while in 9 per cent it was precipitate. It was also noted that in 47 per cent of the mature cases and 52 per cent of the premature cases where this tear occurred, breech delivery had taken place. The author concludes that many infants with quite extensive birth hemorrhages are born alive and survive.

NORMAN F. MILLER.

Cameron, Hector Charles and Osman, A. A.: *The Late Results of Meningeal Hemorrhage of the Newborn*. *British Medical Journal*, March 3, 1923, No. 3244, p. 363.

There is general agreement that meningeal hemorrhage is by far the most common cause of death in fresh nonmacerated fetuses and in infants dying shortly after the conclusion of labor. It is impossible not to conclude with Osler, that many, and perhaps the larger number, escape with their lives but suffer permanent damage in varying degree. There are, however, difficulties in the way of unqualified acceptance of the view that in the numerous cases of cerebral diplegia which present themselves later in life, we are encountering the aftermath of this damage at the moment of birth.

Apart from meningeal hemorrhage two other views have been held of the origin of cerebral diplegia dating from birth. Some writers regard the majority of cases as due to infective meningoencephalitis, intranatal or neonatal. To assess the part played by developmental defect in the production of cerebral paraplegia and diplegia is even more difficult.

The authors wish to stress the high degree of mental development which many of these children damaged at birth ultimately achieve, however great the delay in acquiring certain functions may be in infancy and early childhood.

After recovery from the initial shock of the hemorrhage it is clear that, as a rule, a period of latency follows which lasts for many months. A consideration of the order in which the different parts of the brain are developed explains the length of the interval which usually intervenes between birth, when the damage is sustained, and the time when the child is brought to the doctor and complaint is made of failure to grasp, to sit, to walk, or to speak.

A long and close study of a group of some thirty of these cases, of all ages from earliest infancy to adolescence, has convinced the writers that they differ unmistakably from cases of primary mental defect with spasticity due to developmental causes.

Among cases of infantile diplegia or paraplegia it is possible to recognize a group in which the defect is confined to the sensorimotor cortical areas. Probably all cases in this group are due to birth injury, although all cases of birth injury may not belong to the group.

Since education at first proceeds almost entirely by sensorimotor paths there is in early childhood a deceptive appearance of gross mental defect. In later childhood progress may be rapid and recovery almost complete. The difficulty is overcome by the remarkable persistence in effort which is characteristic of most of these children. Even when voluntary movements remain stiff and awkward the child may be a quick learner by eye and ear. Incoordination may remain though character and intelligence may be on a high plane. F. L. ADAIR.

Ballantyne, J. W.: *Antenatal, Intranatal, and Neonatal, Death: Causes, Pathology, and Prevention, with Special Reference to Antenatal Death*. *British Medical Journal*, September 30, 1922, No. 3222, p. 583.

The author reviews investigations and work done relative to stillbirths. He thinks the following statements may be assumed to be fairly accurate: (1) That there is a great loss of life in the form of stillbirths, the large proportion being due to venereal maladies. (2) There is a great gain in preventing these stillbirths by antenatal supervision and treatment even in the worst group of cases, namely, the venereal infection. (3) That the vast number of stillbirths are preventable.

The general conclusion of the whole matter seems to be that whilst much remains to be done in the study of the causes and pathology and pathogenesis of

stillbirths it is possible to go forward at once in the prevention of them by antenatal supervision and treatment with bright hopes of substantially reducing their number. Therefore every expectant mother and her unborn infant ought to be able to receive efficient and adequate antenatal care either from her own doctor or through the maternity hospitals and homes of her native land. F. L. ADAIR.

**Holland, Eardley:** Intranatal Deaths. *British Medical Journal*, September 30, 1922, No. 3222, p. 588.

Examination of a large number of stillborn fetuses shows that more have died from complications of labor than from maternal or fetal diseases. These fetuses are healthy and therefore worth saving. Classification of the causes of intranatal death is a very difficult matter; for instance, in a case of placenta previa the immediate cause of fetal death may be a cerebral hemorrhage due to manipulation made in attempting to control the maternal hemorrhage. A practical classification, therefore, is needed under the various primary causes—namely, maternal states, placental states, and fetal states. Evidence can be found at postmortem examinations that the complications of labor account for 51 per cent of fetal deaths. This postmortem evidence consists as a rule in the presence of cerebral or visceral hemorrhages. In half the cases it is found that the tentorium cerebelli has been torn. This condition has been found in 88 per cent of dead fetuses after normal breech delivery. The present teaching is to hurry the delivery of the aftercoming head for fear of pressure on the cord. In light of the evidence now brought forward this teaching must be revised, as actually the fetus is killed by compression of the head, brought on principally by forcible efforts being made to complete the extraction of the child. The head, therefore, should be allowed time, even so long as ten minutes if absolutely necessary. F. L. ADAIR.

**Browne, F. J.:** Neonatal Death. *British Medical Journal*, September 30, 1922, No. 3222, p. 590.

The author reports a series of 400 cases of stillbirths and neonatal deaths. In this series there were 153 neonatal deaths. The causes of death in these cases were fifty-three deaths from cerebral hemorrhage, most of them intraventricular, and suprarenal hemorrhage in twenty-seven. Only six of these were born alive. Hemorrhages were also found in other portions of the body. There were thirty-five neonatal deaths due to syphilis. Pneumonia was found present in forty-eight of the cases, being the most common cause of postnatal death. The author presents the following recommendations regarding the prevention of neonatal death: First, adequate supervision during pregnancy to prevent deaths from birth injuries and preventable infections. Second, the guarding of the infant against contact infections. Third, more careful training of students in obstetric practice.

F. L. ADAIR.

**Kaiser:** Hemorrhagic Disease of the Newborn. *New York Medical Journal*, 1922, cxvi, 156.

Hemorrhagic disease of the newborn occurs in one of every one hundred births. The etiology and pathology of the disease is still obscure, but there exists a disturbance of the prothrombin-antithrombin balance. Intracranial hemorrhage is frequently a local manifestation of a hemorrhagic diathesis rather than of traumatic origin. Hemorrhagic disease occurs in an easy labor as often as in a difficult one. Injections of whole blood, of serum or of prothrombin given early

materially improve the chance for recovery. The early use of spinal puncture with a hypodermic injection of serum in the case of suspected intracranial hemorrhage is advocated.

MARGARET SCHULZE.

**Falls, F. H.:** Blood Transfusion by the Citrate Method in Hemorrhages of the Newborn. *Journal American Medical Association*, 1923, lxxx, 678.

A comparison of the different methods of utilizing adult blood for the control of hemorrhage in the newborn is made and the technic for procedure is given in detail. Citrated blood is injected into the jugular vein which is exposed by an incision. Grouping is not done, for as Falls points out, the hemagglutinins and precipitins are not developed in the child to any great extent until the second year. He claims for the method simplicity, safety, and better results than can be obtained by any other method of blood transfusion.

W. KERWIN.

**Jacobs, Max W.:** Retinal Hemorrhages in the Newborn. *Journal of American Medical Association*, 1924, lxxxiii, 1641.

A series of 190 infants was examined after birth with the purpose of noting injuries of the eyegrounds. Of 157 examined within the first twenty-four hours and mainly considered in this paper, 19 (12.1 per cent) showed retinal hemorrhages, which were either arranged radially about the disk or were of circular form. Thirty-six per cent of the injuries occurred in primiparous mothers, 68 per cent in multiparas. In eight of the nineteen cases a perineal forceps had been applied; two contracted pelves were among the nineteen cases. The writer emphasizes that such traumatic lesions frequently result in permanent changes within the eye. He does not go into detail as to the probable cause of the hemorrhages in these nineteen instances, but in regard to the etiology of retinal hemorrhages refers to the theories collected in Ehrenfest's monograph.

GROVER LIESE.

**Crothers:** Injury of the Spinal Cord in Breech Extraction as an Important Cause of Fetal Death and of Paraplegia in Childhood. *American Journal of Medical Sciences*, 1923, clxv, 94.

The cause of spinal cord injury and its effect, either paralysis or death, is taken up by Crothers, and with the aid of results in animal experiments and war injuries, he is able to show that immediate death is dependent on some other factor aside from the cord injury itself. He explains why birth injuries to the cord are caused by breech extraction and details the history of five cases. He offers the suggestion that herniation of the medulla through the foramen magnum produced by the pressure on the aftercoming head is responsible for death. This would preclude the theory that fetal death in breech extraction is practically always due to asphyxia.

W. KERWIN.

**Stern, A.:** Etiology of Congenital Torticollis. *Monatsschrift für Geburtshilfe und Gynaekologie*, 1924, lxxv, 179.

A baby with marked wry-neck was delivered by cesarean section from a patient who was 43 years old. The child had presented by the breech, and labor had continued for forty-eight hours without much progress. After birth the head of the baby remained flexed on the left side at an angle of 45 degrees. On the left side of the baby's neck was a marked depression due to atrophy of the muscle. Into this, the left shoulder fitted snugly.

In this case the theory that torticollis is due to birth injury of the sternocleidomastoid muscle can be ruled out. Neither was there an intrauterine myositis. During labor the breech of the fetus rested on the symphysis and the uterus hung forward. The membranes ruptured early and during the forty-eight

hours of labor the pains increased the abnormal deviation of the fetal head. This and the position of the fetus during the last few months of pregnancy, which remained unchanged, explain the deformity of the child. This case supports the theory that congenital torticollis is due to an abnormal attitude and lack of space in the uterus. It also illustrates that the pressure of the shoulder against the neck produces atrophy of the neck muscles through disturbances in the vascular circulation.

J. P. GREENHILL.

**Boorstein: Obstetric Brachial Paralysis.** *Journal American Medical Association*, 1924, lxxxii, 862.

Boorstein speaks of the common occurrence of obstetric brachial paralysis and warns against an early ill-prognosis by the attending obstetrician. Early treatment by the orthopedist is urged. In a study of sixty-four patients some interesting phases of etiology are brought out. Types and methods of treatment with reference to the literature are detailed. The worker's conclusions are:

Obstetric brachial paralysis is due to stretching or tearing of the cervical roots of the brachial plexus. It is almost always associated with a difficult labor, in many instances, forceps having been used. The right side is more often affected than the left. Affection of both arms is very infrequent. The upper arm type is due to injury of the suprascapular, and fifth and sixth cervical nerves. It is much more frequent than the lower arm type. The whole or lower arm type is due to injury of the entire plexus.

Vertex presentation shows the larger percentage of occurrences of both types of cases. Improper management of the shoulder is responsible for many cases; hence they may be prevented by the obstetrician. If these cases are treated early and properly, one may expect in the mild cases a good recovery in three or four months. The more severe cases will require about six or seven months for a complete recovery.

Nerve operations are indicated if no advance is made in four months. After that period, if sufficient improvement is noticed, one may wait four months more, provided, of course, proper orthopedic treatment is continued.

W. KERWIN.

**Ehrenfest, Hugo: The Prevention of Birth Injuries of the Child.** *Illinois Medical Journal*, 1923, xlv, 20.

In this paper the writer discusses briefly all the various types of injuries which by no means are limited to the infant's cranium. In his concluding remarks the author makes the following statements: I lay stress on the fact that the child can be more or less severely traumatized also in a normal labor, in a spontaneous labor, if we grant that the term "spontaneous" by common consent includes as well deliveries in which the expulsion of the fetus is actually hastened by a dose of pituitrin. In by far the larger number of instances, however, serious traumas are observed after labors terminated by operations or other artificial means. In this larger group, lack of skill admittedly is an etiologic factor of considerable importance. It may be lack of diagnostic ability, a lack of judgment, or mere awkwardness of technic, not rarely superinduced by bewilderment or by undue haste. I wish to place the accent on "haste." Routine version followed by immediate extraction to eliminate the second stage of labor, forceps extractions even on high heads to shorten labor, forceps extractions in the second stage of twilight labors to avoid the inevitable delay through the elimination of important accessory expulsive forces, large doses of pituitrin often given in short intervals, all these procedures find their enthusiastic advocates in modern obstetric literature. Do they, in their last analysis, express anything else but haste of some sort? Is this haste in the interest of the mother entirely free of harm to the child? I answer this question with an emphatic "no."

R. E. WOBUS.

**Füth: Spasmodic Cervical Contraction and Injury to the Child's Head during Labor.** *Zeitschrift für Geburtshilfe und Gynäkologie*, 1923, lxxxvi, 633.

The author reports a personal case and cites several cases from the literature, in which a ringlike pressure necrosis of the soft tissues of the child's head resulted from a spasmodic contraction of the cervix about it. In all cases, labor was prolonged and there was premature rupture of the membranes. In several cases, it could be definitely demonstrated that the spasm was at the internal rather than the external os, and the author believes that this holds true in all cases. The condition appeared in two successive labors in the author's and one other case, although there was no pelvic contraction or other demonstrable cause. Several of the children died as the result of infection of the necrotic area.

MARGARET SCHULZE.

**Heidler, H.: Congenital Defects of the Scalp.** *Wiener Klinische Wochenschrift*, 1924, xxxvii, 114.

Heidler states that despite the fact that there are only forty-two cases of congenital defects of the scalp reported in the literature, this anomaly is much more frequent than is generally supposed. In many cases the defect is small, and is therefore overlooked or is considered as a birth injury. Among the cases reported in the literature are many defects measuring as much as 7-9 cm. The case reported by the author was a full-term child weighing 2610 gms. and showed no signs of prematurity except a dense lanugo. Over the parietal bone there was a defect, 5 cm. by 2.5 cm., the floor of which was a gray, opaque, moist membrane. The margins of the defect were sharply defined and surrounded by normal hairy scalp except anteriorly where there was an area in which the hair was missing. The bone was also missing under this defect of the scalp and that portion of the parietal bone lying anteriorly to the defect was soft and spongy in consistency. In the first days following birth the moist membrane forming the base of this defect underwent mummification and dry gangrene. When four weeks of age, a severe hemorrhage occurred which required compression bandages to control the bleeding, and following this, bleeding occurred whenever the child cried. When two months old meningitis set in and death occurred. A partial autopsy revealed the fact that the bleeding occurred from the longitudinal sinus. The author comments on the striking similarity between this case and one reported by Moelle which had a similar structure and termination. He then considers the various theories as to its etiology. He does not believe such defects to be due to amniotic adhesions but states that they are primary inhibitions of development of unknown etiology.

RALPH A. REIS.

**Walz, W.: Etiology of Congenital Skin Defects of the Scalp.** *Monatsschrift für Geburtshilfe und Gynaekologie*, 1924, lxxv, 167.

Three cases of congenital defect of the skin of the scalp were observed by the author. On the basis of these cases and a review of the literature the author condemns their amniotic origin. While for an occasional case the amniotic origin may be the right one, it is certainly not the determining factor in the majority of cases. The author believes that these skin defects just like harelip, syndactylism, etc., have an endogenous causation. The congenital skin defects of the scalp show the following etiologic progressive stages: acrania, hemicrania, encephalocele, congenital defect of the scalp.

J. P. GREENHILL.

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### A STUDY OF PNEUMONIA IN THE STILLBORN AND NEWBORN\*

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UNQUESTIONABLY, if autopsies on the newborn are conducted with as much care and thoroughness as is customary in the examination of adult bodies, the number of unexplained deaths, after due consideration of clinical histories, can be reduced to a very small figure. Improved methods in the technic of performing autopsies have recently done much to emphasize the frequency and nature of intracranial and spinal birth injuries. Another section of pathology of the newborn which awaits full recognition of its importance, and a realization by the obstetrician of the significance of the findings in relation to the management of childbirth, includes the various lesions of the respiratory tract.

Recently we have reviewed all the cases showing evidence of pneumonia, and other pulmonary lesions, in the records of autopsies at the Sloane Hospital during the past five years. The present paper includes a brief summary of the findings and conclusions, together with details of our work on certain types of lesions to which we have devoted special study.

Although a moderate number of cases of pneumonia in stillborn and newly born infants have been recorded in the literature from time to time, especially those showing heavy infections, there have been but few studies of extended series of cases. Hess Thaysen<sup>1</sup>, to whose

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\*Read by invitation before the New York Obstetrical Society, November 11, 1924.

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paper reference may be made for a bibliography of earlier cases, in 1924 reported finding a high percentage among the autopsies on infants dying during the first three days after birth. In his first group of forty-nine autopsies, from 1901 to 1910, about 8 per cent showed pneumonia, but in a second group of thirty-two babies, autopsied during 1910 and 1911, after he began to pay particular attention to the subject, he found pneumonia in 42 per cent. Hess Thaysen classified the modes of infection leading to pneumonia in the newborn as follows:

1. Infection from the mother through the placenta—"diaplacental" infection.
2. Aspiration pneumonia, including aspiration of (a) contents of a pathologically infected uterus or vagina; (b) secretion of a normal birth canal; (c) food or secretions in the nose or mouth of the baby, aspirated after birth.
3. Aerogenous infection, after birth.
4. Metastatic pneumonia, as from a primary infection of the navel or intestine.

Hess Thaysen attributed most of the infections in his series to aspiration of virulent organisms from the birth canals of apparently normal mothers. He did not believe that the pneumonia began *in utero*, from aspiration of infected amniotic fluid; but it is to be noted that he did not examine the placentas and membranes in these cases, and also that his autopsies did not include microscopic examinations of stillbirths.

In eighty cases of death of infants during the first week after birth Browne<sup>2</sup> found pneumonia in twenty-one, or 26 per cent. He noted the large proportion occurring in prematures, and concluded that the premature infant is about fourteen times as liable to die from pneumonia as the infant born at full term. He commented on the insidious nature of the disease, and the fact that the diagnosis may be missed, even after postmortem examination, without a microscopic examination of the lungs. In several cases the lesions were very hemorrhagic, forming what he believed to be a distinct clinical and pathologic entity. In two cases, with premature rupture of the membranes, and infection of the amniotic cavity, the babies were apparently born with pneumonia, and died after delivery. This finding was confirmed by a later report of five cases of pneumonia in dead-born infants. All of these were in cases of prolonged labor with early rupture of the membranes<sup>3</sup>.

The cases studied by us were found in a series of 500 autopsies at the Sloane Hospital during a period of a little over five years. These autopsies are consecutive, with the omission of a certain number of macerated stillbirths and traumatic cases in which no microscopic examinations were made, so that no definite conclusions could be drawn as to the condition of the lungs.

The list includes nonviable and viable fetuses, stillborn and newborn infants, and, therefore, is made up of a much wider variety of conditions than is to be expected in the newborn alone. In the 500 autopsies

we have found evidence of pneumonia in ninety-seven, or 19.4 per cent. Of course, in many of these the pneumonia was not the sole or chief cause of death. It is to be emphasized that the types of pneumonia described here should not be confused with the "pneumonia alba" of congenital syphilis, although a small number of syphilitic babies are included in the series.

The cases may be divided into four groups, basing the classification chiefly according to the probable time of infection and the time of death.

- |   |           |
|---|-----------|
| I. Antenatal infection; antenatal or intranatal death.  | 30 cases. |
| II. Probable antenatal or intrapartum infection; death usually within three days after birth. | 38 cases. |
| III. Pneumonia with "hyaline membrane" (type of asphyxia neonatorum).                         | 8 cases.  |
| IV. Postnatal infections.   | 21 cases. |

#### ASPIRATION OF AMNIOTIC FLUID

As our observations have led us to believe that practically all of the cases in groups I and II are caused by infection of the amniotic sac and aspiration of infected amniotic fluid, a study of the relations between the fetal respiratory tract and the amniotic fluid is of prime importance. The lumen of the fetal respiratory tract is continuous with the amniotic cavity. The fetus *in utero* is submerged in the amniotic fluid, which enters the nose, mouth, and pharynx. It appears to be uncertain whether the fluid normally enters the trachea and bronchi, depending on how tightly the glottis remains closed.

The respiratory center of the fetus *in utero* is undoubtedly less responsive than that of the mother, although Ahlfeld<sup>4</sup> obtained tracings from impulses transmitted through the abdominal wall over the uterus, which he believed indicated that the fetus normally made slight but regular respiratory movements. Whether this is true or not, the amniotic fluid is not ordinarily drawn into the atelectatic pulmonary alveoli, except in minimal amounts. In case of asphyxia, however, the fetal respiratory center is undoubtedly stimulated, with resultant expansion of the lungs, and aspiration of amniotic fluid into the alveoli.

While the means of identifying amniotic fluid in the lung have long been described in medicolegal literature, they do not appear to be familiar to many obstetricians and pathologic anatomists. The liquor amnii is not easily detected by its fluid constituents, which in fixed sections appear to give rise to a granular precipitate hardly distinguishable from edema. But, suspended in the fluid, are numerous cornified squamous epithelial cells which have desquamated from the skin of the fetus. In addition, the epidermal cells are accompanied by globules or masses of fat from the vernix caseosa. Lanugo hairs may also

be found. Of these elements the cornified epidermal cells are the most constant, characteristic, and reliable evidence of the presence of amniotic fluid. (Figs. 1 and 2.)

In ordinary sections stained by hematoxylin and eosin for routine examination, the epidermal cells are seen most distinctly when they



Fig. 1.—Cornified epidermal cells in amniotic fluid. Identification of amniotic fluid aspirated in infants' lungs depends chiefly on the presence of these cells, desquamated from the skin of the fetus. Illustration shows a paraffin section of sediment from an uncontaminated specimen of amniotic fluid from a case of cesarean section. (High power photomicrograph.)



Fig. 2.—Section of fetal skin covered by vernix caseosa, showing desquamating cornified epidermal cells. Large numbers of these cells become dislodged, and float in the amniotic fluid. Fat of the vernix caseosa is not shown in the photograph, having been dissolved as the tissue was embedded in paraffin.

are turned on edge or obliquely to the plane of the section. In this position they are cut so as to appear as coarse, wavy, purple-staining, somewhat refractile threads. When seen on flat, they are not so distinct, as they are thin and transparent. The small round nuclei can usually be seen in only a few of the cells.

Several special stains may be of assistance in the detection of amniotic fluid aspirated in the lungs.

1. The keratin of the epidermal cells may be stained differentially, according to a method proposed by Strassmann<sup>5</sup>. Instead of the original method it was later found that the Gram stain could be substituted. We have found that by our usual technic for the Gram stain the epidermal cells are Gram negative, but, if after treating with aniline methyl-violet followed by Gram's iodine solution in the usual way, the section is decolorized for a very brief time—three to five seconds—with acetone, and then washed and counterstained with safranin, the cornified cells retain the blue color, while the remainder of the section is red.

2. Fat of the vernix caseosa, as Hochheim<sup>6</sup> found, may be demonstrated in the lung in formalin-fixed frozen sections stained by Sudan III and hematoxylin. The red-staining droplets of fat may be present in large numbers, and usually accompany the epidermal cells.

3. In sections stained for the *Treponema pallidum* by the Levaditi silver method, the cornified epithelial cells are dark brown, or black.

In cases of severe fetal asphyxia, when the anal sphincter has relaxed, and meconium escapes into the amniotic cavity, the small round or oval yellowish brown masses characteristic of meconium may be found, microscopically, mixed with amniotic fluid aspirated into the bronchi and alveoli. Balthazard and Piédelièvre<sup>7</sup> have described a special stain for these particles, for mucin, and lanugo hairs. Meconium is also frequently packed with epidermal cells, derived from amniotic fluid which has been swallowed by the fetus.

No particular significance can be attached to the finding of very small amounts of amniotic fluid in the lungs. This occurs in the majority of cases, and in the newborn may represent only the amniotic fluid present in the nose and mouth, which is drawn down into the lungs with the first respirations after birth. If the air passages are not well cleared before respiration begins, of course a larger amount may be aspirated.

From our own observation, as well as the statements of others, we are convinced that the presence of a large amount of amniotic fluid within the lung is indicative of a certain degree of fetal asphyxia. The causes usually assigned for this condition are insufficiency of the placental circulation, compression or true knots of the cord, and excessive contractions of the uterus.

Not counting any of the cases of pneumonia, there were thirty-nine babies in our own series of autopsies, who were recorded as showing marked aspiration of amniotic fluid. Of these, thirty-one were still-born, eleven being macerated, and eight died after birth. Of the latter, three were breech deliveries and two cesareans. Among the eleven macerated stillbirths there was one premature separation of the pla-

centa, one cord tight around the neck, and one true knot of the cord. In this last case we found the most marked example of aspiration of amniotic fluid in our records, and it furnishes convincing evidence of the effect of fetal asphyxia. (See Fig. 3.)

The question whether aspiration of a large amount of normal uncontaminated amniotic fluid can give rise to an inflammatory reaction in the lung is a difficult one to decide. The evidence in general seems to be against it, although some of our cases in Group III may be exceptions. The epidermal cells have been found in the lungs for several days after birth without any signs of inflammation. They are not attacked by phagocytes, nor do they cause the formation of foreign body giant cells, but appear to undergo a slow dissolution.

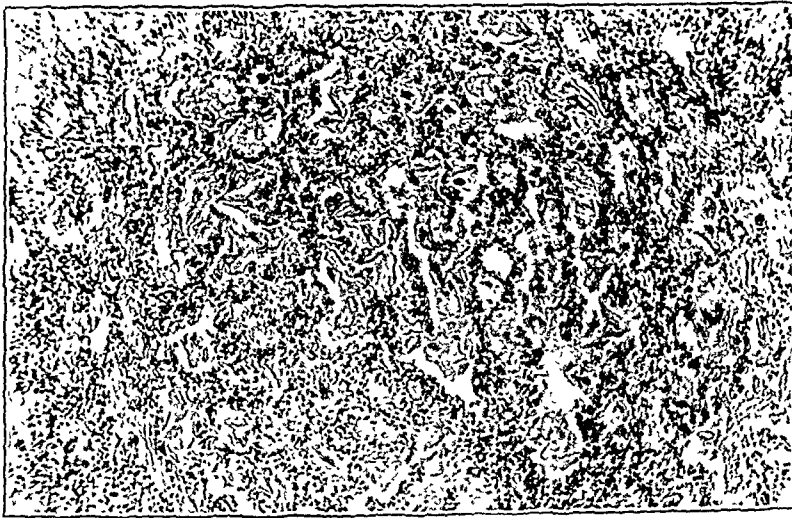


Fig. 3.—Section of lung of a macerated fetus dying from intrauterine asphyxia caused by a true knot in the umbilical cord. The alveoli are packed with epidermal cells carried in by amniotic fluid which apparently flooded the lungs during respiratory movements in utero, brought on by asphyxia.

On the other hand, choking of the air passages by a large amount of aspirated material may lead to a serious condition of asphyxia, if the child survives birth.

#### PATHOLOGIC CHARACTERISTICS OF CONGENITAL PNEUMONIA

Groups I and II of our series are so closely related in etiology and pathology that they may be considered together as "congenital pneumonia." In the first group the fetus is infected earlier and dies before birth. In the second group the infection apparently begins at a shorter time before birth, or progresses more slowly, so that the baby survives birth, but usually dies within three days.

In the great majority of cases it is practically impossible to recognize the presence of the pneumonia from the gross appearance of the lungs at autopsy. They may be slightly larger than normal and may sink or float, depending on the degree of atelectasis present. They are not consolidated, but have a fleshy consistency. The cut surface has

a reddish moist appearance, and suggests edema and congestion, rather than pneumonia. Pleuritis is rarely noted.

Microscopically, a large proportion of the lungs show a type of lesion which is different from the usual varieties of lobar and lobular pneumonia with which we are familiar. The special feature in this type is the diffuseness or wide extent of the inflammation, which may involve fairly uniformly practically all of the alveoli throughout the whole lung. The exudate within the alveoli consists of a small or moderate number of polymorphonuclear leucocytes, with a few mononuclear cells, and a variable number of red cells. Fibrin is usually absent, or present in minimal amounts. The interstitial framework of the lung is only slightly involved. The bronchi usually contain a small amount of exudate. (Figs. 4 and 5.)

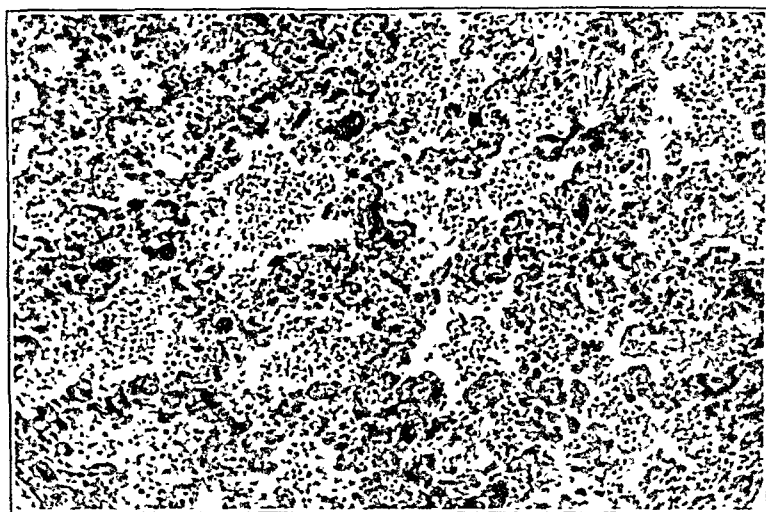


Fig. 4.—Section of lung from infant dying of congenital pneumonia 11½ hours after birth. Nearly all of the alveoli contained polymorphonuclear leucocytes (diffuse type of congenital pneumonia). (Low power photomicrograph.)

The diffuseness of this form of pneumonia is due, we believe, to the fact that it commences in an atelectatic lung, through which the infection is widely spread by the aspiration of infected fluid. Not all of the cases show this diffuse lesion. In many the distribution is distinctly patchy, probably owing to a more irregular and scantier aspiration of infected material, and also to aeration after birth.

In addition to the exudate within the alveoli, one may find a variable quantity of the elements of amniotic fluid, which indicate the mode of conveyance of the infection. (Fig. 6.) But although asphyxia with aspiration of infected fluid undoubtedly aids the spread of infection through the lung, this is not a necessary factor, as the bacterial growth from an infected amniotic sac may be propagated through a continuous stationary column of fluid and secretion from the nose or mouth down the trachea and bronchi to the lungs.

Bacteriologic study of our cases has been incomplete and unsatis-

factory. As the pneumonic lesions are so difficult to recognize at autopsy, only a few cultures were made, but nearly all of the lungs were examined for bacteria in Gram-stained sections. Failure to find organisms so many times led us to suspect that some of the cases might be chemical pneumonias produced by aspiration of amniotic fluid mixed

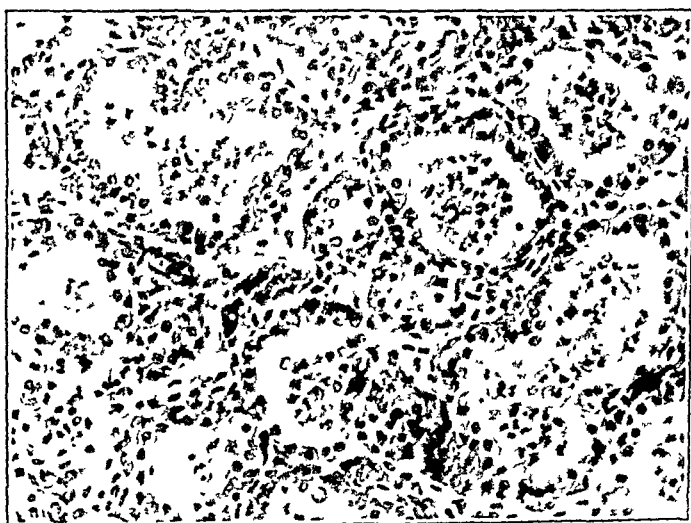


Fig. 5—High power photomicrograph showing diffuse pneumonia in a nonviable stillborn fetus weighing 590 grams. The glandular appearance of the alveoli, lined by cuboidal epithelium, is due to prematurity. Most of the alveoli contain polymorphonuclear leucocytes. Although the clinical record indicated that the membranes had ruptured only 37 minutes before delivery, a microscopic examination of placenta, cord, and membranes showed acute inflammation, indicating infection of the amniotic sac. Section of the lung contained Gram negative bacilli.



Fig. 6—Pneumonia from aspiration of infected amniotic fluid. Full-term stillbirth. Membranes ruptured eighteen and one-half hours before delivery. Microscopic examination showed inflammation of surface of placenta and membranes. The air space in the center of the photograph contains leucocytes, mixed with granular debris and cornified epidermal cells from amniotic fluid. The flat epidermal cells, cut obliquely, or on edge, appear as wavy threads.

with antiseptics such as lysol, which might pass through the vagina back into the amniotic cavity. We have not been able to confirm this suspicion, but believe that it is a possibility which should be guarded against.

Analysis of the cases in the different groups has brought out many interesting facts.

#### GROUP I. ANTENATAL PNEUMONIA: ANTENATAL DEATH

Of thirty infants in this group, six were under 1500 grams, two were between 1500 and 2500 grams, and twenty-two weighed more than 2500.

The distribution of the pneumonia was diffuse in twenty-two cases, patchy in eight. In most of the patchy lesions the exudate was scanty. Fourteen of the thirty cases showed marked aspiration of amniotic fluid.

Clinically, the most significant fact in relation to these cases is that most of them gave a history of premature rupture of the membranes, or prolonged dry labor.

According to the time of rupture of membranes before delivery the cases were grouped as follows:

Under 2 hours	5 cases	Over 2 days	5 cases
2 to 12 hours	3 cases	Unknown	2 cases
12 to 24 hours	4 cases	Unruptured abortion	1 case
24 to 48 hours	6 cases		

Sections from twenty-five of the cases were examined for bacteria, of which only eight were positive, but it is significant that six of these were from the cases having the longest periods of dry labor. The organisms found were cocci resembling staphylococci, streptococci, and Gram-positive and Gram-negative bacilli. Pneumococci were not found in any of the congenital pneumonias.

The placenta and membranes were examined in thirteen of these cases, and eleven were found acutely inflamed. Two were normal.

Slemons,<sup>8</sup> in calling attention to the rôle of infection of the amniotic cavity in the causation of fetal death, stated his belief that a common path of infection is through the amnion to the fetal blood vessels in the chorion. As none of the infants in our series have shown evidence of infection in any way other than through the nose or mouth, we are inclined to think that the respiratory tract is much the commoner route.

In this group there were twelve vertex presentations, eleven versions or breeches, and six forceps deliveries.

The following case illustrates the result of a heavy infection of the amniotic cavity.

CASE 1.—Sloane Autopsy 1144. Stillborn baby weighing 2825 grams, was delivered 4 days and 7 hours after rupture of membranes. The fetal heart stopped several hours before delivery. At autopsy the lungs showed a bronchopneumonia, with marked aspiration of amniotic fluid and meconium. (Fig. 7.) The aspirated material and exudate contained many Gram-positive cocci and Gram-negative bacilli. (Fig. 8.) The lungs contained many emphysematous patches due to collections of gas bubbles. The stomach and upper half of the small intestine contained



gas and large numbers of bacteria. There was no evidence of peritonitis, and culture from the peritoneum was sterile.

The fetal membranes, cord, and surface of the placenta showed intense inflammation.

Except for foul-smelling lochia the mother's record shows no evidence of sepsis, and she left the hospital in good condition.

Another case is one in which an erroneous diagnosis of death from trauma might have been made, without a microscopic examination of the lungs:



Fig. 7.—Section of lung from Case I. Bronchopneumonia in stillbirth delivered 4 days and 7 hours after rupture of membranes. In the center of the photograph is a small bronchus containing aspirated amniotic fluid and purulent exudate. The alveoli in the upper part of the picture show emphysema from growth of gas-producing bacteria. (See Fig. 8.)

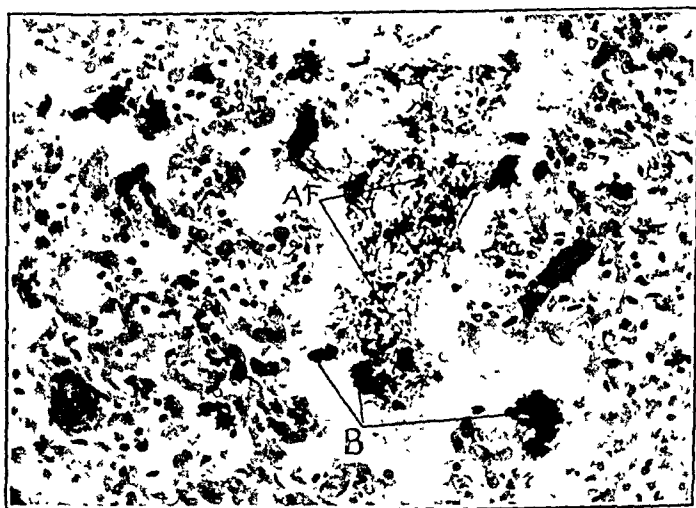


Fig. 8.—Section of lung from Case I, stained for bacteria, which appear in the photograph as irregular black masses (*B*). The bacteria appear to accompany aspirated amniotic fluid, cells from which (*A. F.*), mixed with leucocytes, are present in the air space in the center of the picture.

CASE 2.—Sloane Autopsy 1285. A full-term infant weighing 3600 grams was delivered by rather easy mid-forceps application. The cord was tightly wound around the neck. The baby was alive at birth but could not be made to breathe. Microscopic examination of the lungs showed a diffuse pneumonia with aspiration of amniotic fluid. The sections contained large numbers of staphylococci.

In this case death was probably due to a combination of asphyxia, and pneumonia from aspiration of infected amniotic fluid. The membranes had been ruptured forty-six hours before delivery. The amniotic surface of the placenta, membranes, and cord was acutely inflamed. The mother showed only a slight rise in temperature with offensive lochia.

#### GROUP II. ANTENATAL INFECTIONS: POSTNATAL DEATH

We agree with Hess Thaysen that nearly all of the infants dying of pneumonia within three days after birth, do so as a result of antenatal infection. There are undoubtedly some exceptions, both as to longer duration of life, and the occurrence of postnatal infection.

In our series of thirty-eight cases there were twenty-one deaths on the first day, ten on the second day, six on the third day, and one on the fourth day.

Ten weighed under 1500 grams, eight between 1500 and 2500 grams, and twenty weighed over 2500.

The symptoms and physical signs were rather meagre and inconstant. The most frequent symptoms noted were cyanosis and difficult respiration. In most cases there was practically no fever, although one case reached  $104.8^{\circ}$ . Two babies had convulsions. Except for the presence of some râles, physical signs in the chest were practically nil. Apparently it is impossible in most instances to make a clinical diagnosis of congenital pneumonia.

Eighteen cases were recorded as showing a diffuse type of pneumonia at autopsy, while an equal number were patchy in distribution. One case showed a lobar consolidation with pleuritis, and one had abscesses.

Most of the diffuse and patchy lesions showed the usual characteristics of congenital pneumonia. In twenty-one there was evidence of marked aspiration of amniotic fluid. Of twenty-nine lungs examined for the presence of bacteria in sections, the findings were positive in eighteen. The organisms usually found were Gram-positive cocci suggesting staphylococci. Streptococci, Gram-positive and Gram-negative bacilli were also found.

The time between rupture of membranes and delivery was recorded as follows:

Under 2 hours	11 cases	24 to 48 hours	2 cases
2 to 12 hours	12 cases	Over 2 days	2 cases
12 to 24 hours	2 cases	Unknown	9 cases

This group does not show as high a proportion of long dry labors as the first group, nor were the periods so prolonged. This is what might be expected, from the effect on the fetus. That is, the longer the period of dry labor the greater is the chance of the fetus becoming infected and dying before birth. When the period during which infection takes place is shorter, the baby has a better chance of surviving until after birth.

The placenta, membranes, and cord were examined in nine cases. Six were acutely inflamed, one was normal, and two showed evidence of syphilis.

The deliveries were vertex in twenty-six cases, breech in six. Five were forceps cases, one a cesarean section, and one a precipitate in a toilet.

The presence of a focus of infection in the mother has been noted in only a very small number of cases, and so far as we have been able to judge, this is not a very conspicuous factor, nor did many mothers show evidence of postpartum infection.

Eleven of these cases in this group were recorded as having periods of ruptured membranes under two hours. This would seem to be an argument against the rôle of infection of the amniotic cavity as the explanation of all these pneumonias. But in one case where the membranes were said to have ruptured only five minutes before delivery, and in another rupturing thirty-three minutes before delivery, the placenta and membranes were found to be acutely inflamed.

This means that we must accept the possibility of infection of the amniotic cavity from the cervix through unruptured membranes, or, as seems more reasonable, attribute the entrance of infection to slight premature ruptures which escaped notice, such as so-called "high ruptures."

A "diaplacental" infection, conveyed to the amniotic sac through the placenta from some focus of infection in the mother is another possibility which must be admitted, as a few fairly convincing cases of this kind are recorded in the literature. That such a mode of infection is frequent is improbable, and we have not been able to place any of our own cases in this group.

Aspiration of vaginal secretion containing bacteria may explain the infection in some cases of congenital pneumonia, and according to Hess Thaysen, is the usual method, but from our own observations we do not believe this to be true.

The presence of an acute inflammation in the placenta and membranes (found in the great majority of the pneumonia cases in which they were examined) indicates the frequency of infection of the amniotic sac and, when such infection is present, conditions certainly favor extension to the fetal lung, as we have already shown. The time when the infection reaches the lungs is variable. It may occur *in utero*, especially when aspiration of amniotic fluid is brought about by asphyxia. If, at the time of birth, infected amniotic fluid is present in the nose and mouth of the baby, the first inspirations may draw this material down to the lungs. This is probably the mode of infection in some of the cases dying two or three days after birth.

On the other hand, as regards aspiration of vaginal secretion, the mechanical conditions obtaining during passage of the head through the birth canal are against it. Most of the material is probably pushed

out in front of the advancing head, while the close approximation of the vaginal wall against the nose and mouth tends to prevent any material from gaining access to them.

### GROUP III. PNEUMONIA WITH "HYALINE MEMBRANE"

This includes cases of a type previously reported by one of us<sup>9</sup> as "pneumonia in the newborn with lesions resembling influenza." Clinically, they are cases of "asphyxia neonatorum." The typical history is that after a normal delivery the baby breathes spontaneously at first, but soon begins to have attacks of cyanosis and dyspnea, which recur at intervals, and with increasing severity, until death. Such cases are probably often diagnosed clinically as atelectasis, or hypertrophy of the thymus. The thymus is within normal limits, however, and incidentally we would state, in contradiction of many current pub-

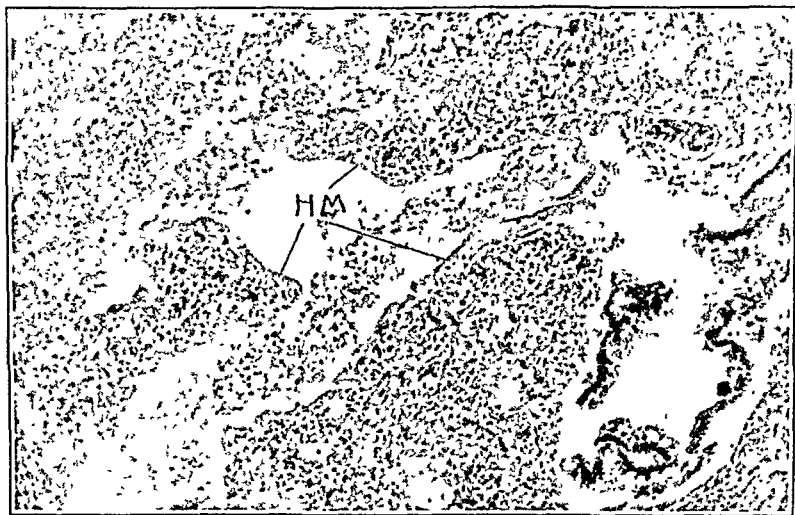


Fig. 9.—Section of lung illustrating type of pneumonia in newborn, with lesions resembling influenza. (Group III.) The air passages in the center of the photograph (dilated alveolar ducts and alveolar sacs) are lined by a narrow layer of homogenous material (hyaline membrane, *H. M.*). The ducts contain a few leucocytes. Premature infant. Death 18 hours after birth.

lications on the subject, our opinion that a true pathologic hypertrophy of the thymus is rare. In our series of over 500 autopsies we have not found a convincing case.

Pathologically, the resemblance of the lesions to those of influenza depends chiefly on the presence of a layer of homogeneous material—a "hyaline membrane"—which lines many dilated alveolar ducts and alveolar sacs, and some of the alveoli. This material stains reddish in hematoxylin and eosin sections. It does not give a reaction for fibrin. The degree of inflammatory reaction, as indicated by the presence of leucocytes, is usually moderate or slight. (Fig. 9.)

These lesions do not seem to be caused by infection of the amniotic cavity following premature rupture of the membranes.

Negative bacteriologic findings, failure to connect these cases with

epidemic influenza, and the fact that similar lesions have been found after inhalation of war gases, and experimentally after intrabronchial insufflation of hydrochloric acid, led us to suspect that this lesion in infants might also be due to the aspiration of an irritating substance. The agents naturally considered were lysol, and the soap which is sometimes used in lubricating the vagina. These materials were not used in some of the "hyaline membrane" cases, however.

To determine whether such lesions could be produced by lysol and soap, we injected various quantities of these substances intratracheally in rabbits, but the lesions produced were not typical of those in infants. Injection of amniotic fluid alone also failed to produce lesions in rabbits' lungs. Whether in certain conditions amniotic fluid can become abnormally acid or irritating must also be considered. In two specimens of uncontaminated amniotic fluid obtained from cesarean section cases, which Mr. T. F. Zucker tested for us, the hydrogen-ion concentration was found to indicate slight alkalinity.

Experimentally, a hyaline membrane resembling that noted in the infants' lungs, was produced by intratracheal injection, in a rabbit, of a small quantity of egg albumen. This suggests that the membrane is produced by a viscous material, which adheres along the walls of the air passages.

Two observations have led us to believe that the material composing the hyaline membrane in babies' lungs, is derived from epidermal cells and fat aspirated with amniotic fluid, probably some time previous to labor. We have several times observed epidermal cells undergoing a transformation into hyaline material, and adhering to the walls of the air passages. In his study of the aspiration of the fat of vernix caseosa into the lungs, Hochheim mentions two cases in which he found layers of homogeneous material adhering to the walls of some of the alveoli, and containing numerous droplets of fat. Believing that these were cases similar to our own, we also studied frozen sections stained by hematoxylin and Sudan III, and found that the hyaline membranes were loaded with fat droplets.

It seems probable, therefore, that this lesion consists in the coating of the walls of the smaller air passages with a layer of viscous material derived from old aspirated cells and fat of the vernix caseosa. While the fetus is *in utero* no harm is produced, but as soon as respiration is established, the air passages become more or less choked by this hyaline material and asphyxia results. The inflammatory reaction may be the result of a complicating infection or secondary to mechanical irritation. This view is strengthened by the fact that in several cases we have noted the presence of a hyaline membrane without inflammatory reaction.

The lungs in this type of asphyxia often present a considerable degree of atelectasis, which is probably due to the plugging of some of the bronchioles by masses of hyaline material. (Figs. 10 and 11.) As

in other cases of so-called congenital atelectasis, the unexpanded condition of the lungs is a secondary lesion. Too often, in assigning causes for death in the newborn, atelectasis has been treated as if it were a primary disease. It should be recognized that in all cases atelectasis is secondary to some primary cause. The most frequent causes are prematurity, trauma, and mechanical obstruction of the air passages.



Fig. 10—Section of lung from same case as Fig. 9, showing choking of bronchioles and alveolar ducts with material derived from aspirated amniotic fluid and vernix caseosa.



Fig. 11—Section of lung from same case as Fig. 9. A bronchiole, at the left, is completely plugged with material derived from aspirated amniotic fluid and vernix caseosa. The adjacent lung tissue shows a considerable degree of atelectasis.

#### GROUP IV. POSTNATAL INFECTIONS

Of twenty-one cases of pulmonary infection which seemed to be clearly postnatal, all but six were in prematures. All but two died within a month after birth, and in half of the number, death occurred between the tenth and fourteenth day.

There were two cases of metastatic infection from the navel, one due

to a streptococcus, the other to a *Staphylococcus aureus*. Four had abscesses of the lung, and there were two cases of lobar consolidation in which the organism found was *Staphylococcus aureus*. Pneumococci were found only once. In three infants the lesions were markedly hemorrhagic.

The frequent finding of the *Staphylococcus aureus* in the infecting organism in these pulmonary lesions is of especial interest. Microscopic examinations of sections of the navel have been made in all these cases, to exclude the possibility of metastatic infection. In many cases the clinical histories of the cases have suggested infection from aspiration of food, either after regurgitation or during gavage feeding.

The pathologic characteristics of the lesions in this group of infections are similar to those found in later infancy.

#### SUMMARY AND CONCLUSIONS

1. In a series of 500 autopsies on the stillborn and newborn, ninety-seven or 19.4 per cent showed evidence of pneumonia. Sixty-eight or 13.6 per cent were probably infected before birth.

2. Congenital pneumonia, due to antenatal infection, is an important complication of birth, and an exceedingly frequent cause of mortality in the stillborn and newborn. The obstetrician should appreciate the importance and significance of this condition, and adopt means for its prevention.

3. The great majority of the cases of congenital pneumonia are apparently due to aspiration of infected amniotic fluid following infection of the amniotic sac after premature rupture of the membranes.

4. Cases of infection of the amniotic sac during dry labor are not usually clinically septic. The danger of this infection is disproportionately greater for the child than for the mother.

5. A study of the condition of the vagina and cervix preceding labor may indicate the line of attack in prophylaxis of this complication.

6. All autopsies on the stillborn and newborn should include an examination of the placenta, cord, and membranes.

7. Congenital pneumonia shows pathologic characteristics which differentiate it from infections acquired after birth.

8. A knowledge of the means of identification of amniotic fluid aspirated within the lungs is important for the study of fetal asphyxia and congenital pneumonia.

9. The presence of a large amount of amniotic fluid within the lungs is an indication of fetal asphyxia.

10. Aspiration of uncontaminated amniotic fluid does not usually produce an inflammatory reaction.

11. A special type of asphyxia neonatorum with or without inflam-

matory reaction, is apparently due to antepartum aspiration of amniotic fluid containing epidermal cells and fat of the vernix caseosa.

12. In death from postnatal infection, occurring frequently in premature infants, a frequent source is aspiration of food.

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(For discussion see page 267.)

## THE CONTROL OF ECLAMPSIA CONVULSIONS BY INTRASPINAL INJECTIONS OF MAGNESIUM SULPHATE\*

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IN several investigations, Meltzer and Auer<sup>1, 2, 3, 4, 5</sup> studied the effect of magnesium salts upon the animal body. The starting point for the investigations was the idea that magnesium salts may have a specific relation to the inhibitory processes of the vital functions. Among the results which have been obtained thus far by these investigators may be mentioned:

1. General anesthesia by subcutaneous injections of magnesium sulphate.<sup>6</sup> In the different species of animals with which these investigators experimented, rabbits, cats, dogs, guinea pigs, white rats, frogs, and fowls, they found without any exception: (1) That a certain dose of magnesium sulphate will produce a deep, often long lasting anesthesia with complete relaxation of all the muscles and abolition of some of the less important reflex activities, which anesthesia terminates in perfect recovery. (2) That a large dose of magnesium sulphate will produce a profound anesthesia and general paralysis which leads sooner or later to a calm death without being preceded or accompanied by any symptoms of excitation.†

2. The intravenous injection of magnesium sulphate for anesthesia in animals.<sup>7</sup> The use of magnesium sulphate by intravenous injections was in general discouraged by Meltzer.<sup>8</sup> However, a series of

\*Read before the New England Division of the American College of Surgeons, May 15, 16, 1923, Worcester, Mass.

†The dose of magnesium sulphate which causes complete anesthesia lies between 1.75 and 1.25 gm. per kilo for the rabbit.



experiments made by Meltzer and Auer with intravenous injections of magnesium sulphate in cases of experimental tetanus, and the meager but satisfactory experience which Kohn<sup>9</sup> and Straube<sup>10</sup> had with the employment of this method in cases of tetanus in human beings induced these investigators to take up the experimental study in animals of the employment of magnesium sulphate by intravenous injections, for the purpose of producing anesthesia.

These experiments justify the following conclusions: By the intravenous injection of this salt into dogs at a certain rate, a stage can be reached where the abdominal walls are completely relaxed and where sections of the abdomen and stimulation of sensitive parts of the parietal peritoneum do not produce pain or elicit any reaction of the animal. At the same time spontaneous respiration may still be maintained within normal limits. When the injection of the salt is continued for a long period, the paralytic effects of the magnesium sulphate will set in, even when administered at a slow rate. The paralysis of the respiratory function is readily met by intrapharyngeal insufflation. When the respirations of the animal are accompanied by insufflation, the paralytic effect of the magnesium sulphate may be abolished fairly rapidly by an intravenous injection of about 10 c.c. of a 2.5 calcium chloride solution.

3. Interruption of conductivity by local applications of magnesium salts to nerve trunks. Local applications to nerve trunks block the conductivity and abolish the excitability of the nerves.

4. Production of anesthesia by intraspinal injections of magnesium salts. The last effect has a special bearing upon the subject of this paper and hence it will be dwelt upon at greater length.

The first experiments made by Meltzer and Auer<sup>11</sup> by injecting a solution of magnesium sulphate in the subarachnoid space of the spinal cord, were made upon dogs, cats, and rabbits. The salts were injected in the lumbar region of the spinal cord which caused anesthesia and paralysis from the pelvis down. The effects were, however, variable. The effects became more uniform as soon as monkeys were used for the experiments.

On the basis of these experiments on these animals they found in a general way that a dose of 0.06 to 0.07 grams of magnesium sulphate to one kilo body weight injected through the fourth lumbar space definitely produces, sooner or later, anesthesia and paralysis more or less pronounced, from which the animal recovers in eight to twenty hours. Repeated at proper intervals this dose caused in many of the monkeys the same general effect without recognizable harmful after-results. This dose, or one a little larger, caused in some instances more pronounced after-effects; the paralysis spread upward and the animal became, in time, generally anesthetic. Even from these pro-

found effects the animals recovered completely in the above-mentioned time. A still larger dose produced, in a comparatively short time, a respiratory paralysis from which the animal died without convulsions.

But even in these cases artificial respiration through a tracheal tube, begun while the heart beat was still present, would soon restore life, and if continued long enough the animal would begin again to breathe spontaneously. A dose of salts which is just sufficient to paralyze the respiration is practically without effect upon the heart beat and blood pressure, that is, without direct effect.

Using these experiments with monkeys as the basis, spinal anesthesia has already been employed upon human beings in cases of tetanus by Blake,<sup>12</sup> Logan,<sup>13</sup> Peck.<sup>14</sup> It may be stated here that in human beings a dose of 1 c.c. of a 25 per cent solution for each 20 pounds of body weight of the patient produces, after some time, deep anesthesia accompanied by considerable relaxation of all the muscles, lasting 24 hours or longer. The respiration is sometimes reduced but the pulse and blood pressure remain nearly normal.

As the results of their experiments of the effect of intraspinal injections of magnesium salts upon tetanus, Meltzer and Auer<sup>11</sup> give the following conclusions:

Intraspinal injections of magnesium sulphate in doses which do not affect the respiratory center or the vital functions, are capable of abolishing completely all clonic convulsions and tonic contractions in cases of human tetanus, and experimental tetanus in monkeys. The relaxing effects of the injections may last 24 hours or more.

In experimental tetanus in monkeys early intraspinal injections of magnesium salts are capable of retarding the progress and development of the tetanus symptoms.

The use of magnesium sulphate for practical purposes of anesthesia in human beings was studied by Haubold and Meltzer<sup>5</sup> by intraspinal method. Meltzer has said "The effects of intraspinal injections were so prompt, so striking, and so harmless, that I felt encouraged and prompted to induce some of my surgical friends to test it in proper cases of human surgery. Twelve patients have so far been operated upon under the sole or essential influence of the intraspinal injection of magnesium sulphate."

Seven operations were performed by Dr. Haubold at the Harlem Hospital, three by Dr. Willy Meyer at the German Hospital, and two by Dr. Blake at the Roosevelt Hospital, all of New York. The dose used was 1 c.c. of a 25 per cent solution for each 20 pounds of weight of the patient. Some of these cases were assisted by small amounts of chloroform. The amounts of anesthetics used varied between 1.5 c.c. to 15 c.c. of chloroform. Chloroform was given in the first eight cases, none in the last four cases. The pulse, respiration and blood pressure remained perfectly normal.

While serving as a house officer at the Massachusetts General Hospital, my (Alton) interest in the intraspinal injection of magnesium sulphate was first aroused. While on duty, a female child, one year old, was admitted to the accident ward. One hour before admission the child had swallowed 12 to 14 pills which its father was taking for stomach trouble. The prescription showed them to contain  $\frac{1}{60}$  grains of strychnine. When the child was first seen it was cyanotic and in an almost continuous convulsion, in which opisthotonos was frequent, with periods of total respiratory inhibition.

Ether was at once administered and the stomach tube passed. In the vomitus coming about the tube and in the stomach washings, three pills and several fragments of pills were recovered. Sodium bromide, 45 grains, was given by rectum, but was at once expelled. Twice the anesthetic was removed, but the child on both occasions had severe general convulsive seizures with opisthotonos and respiratory inhibitions and was saved only by using artificial respiration to get it under the anesthetic.

✓ On account of the clinical similarity of this case to a case of tetanus which had come under our observation, and the similar condition in the spinal cord, we determined to give magnesium sulphate intraspinally. Following the advice of Blake,<sup>15, 16</sup> we injected 0.9 c.c. of a 25 per cent solution in the fourth lumbar space, keeping the head well elevated. The anesthetic was removed. The child at once recovered, seemed lively, and in no danger from respiratory paralysis. Apparently there was some loss of motor control in both legs, but without loss of the knee jerk reflexes.

The convulsions did not recur. The patient was discharged apparently normal. Stimulated by the good result of this case, we (Cutler and Alton) planned a series of experiments on cats<sup>17</sup> to test the efficacy of magnesium sulphate to control strychnia convulsions. After determining the minimal lethal dose we found that after injecting the strychnine the convulsive attacks could be controlled by the injection of magnesium sulphate; i.e., 1 c.c. of a 25 per cent watery solution of the salt to each 20 pounds of body weight.\* In every case following the injection of the magnesium sulphate the same phenomena were obtained: (1) flaccidity to almost total paralysis of the hind legs with failure of response to external stimuli; (2) continued increase of reflex irritability in the rest of the body, gradually diminishing and invariably progressive from the lower spinal region upwards. Few animals evinced any weakness in their hind legs 24 hours after the experiment.

We feel that the results obtained in the human case and in our

\*The more recent advice of Meltzer<sup>18</sup> is 0.5 c.c. per 20 pounds in very young children.

animal experiments justify the supposition that magnesium sulphate may be of use in controlling cases of poisoning by strychnine.

Encouraged by the results of the various experiments on the control of convulsions in strychnine poisoning by the intradural injection of magnesium sulphate, we (Lincoln and Alton) planned to test the effect of this salt, given in the same manner, on the convulsions of eclampsia.

When these experiments on eclampsia convulsions were being carried out by us, we were unaware of the fact that similar efforts had been made previously by others. As early as 1907, H. Einar<sup>10</sup> of a Norwegian college reported the use of this drug with instantaneous results in a case of eclampsia having violent convulsions.

For puerperal eclampsia there are two lines of treatment: (1) the obstetrical, and (2) the treatment to control empirically the symptoms as they arise. The three main indications are: (1) To control the convulsions; (2) to unload the kidneys, and (3) to eliminate the toxins from the organism.

In the four cases which we are about to report, all these lines of treatment were carried out.

CASE 1.—Patient twenty-eight years old, eight months pregnant, started in labor with rupture of membranes at 6 P. M., Nov. 5, 1919, and was delivered normally at home at 10:30 A. M., Nov. 6. Thirty minutes after delivery she had a convulsion. She had two more convulsions before being admitted to the hospital on Nov. 6 at 1:15 P. M.

Patient had measles in childhood and repeated attacks of tonsillitis. She is still subject to tonsillitis, having had four or five attacks during the past six years. Has frequent nose bleed. Married three years. Two miscarriages, one at two months, the other at two and one-half months. Cause of the miscarriages was undetermined. Last period began March 19, 1919. Patient remained in good condition through this pregnancy with no early nausea or vomiting. Urine was tested two weeks previous to labor and found negative. (Before patient was discharged from hospital she stated that she could remember nothing for five days previous to labor, nor could she remember anything about her labor.) Her family state that they noticed nothing unusual about her except that she had slight edema of her face, hands, and ankles for a month previous to labor and she complained of headache and vomited the night before delivery.

*Physical Examination.*—Patient was in a state of coma on admission. Skin pale, dry, with edema of face. Tongue clear. Eyes slight nystagmus, pupils equal and reacted to light and later to accommodation. Tonsils were enlarged. Teeth showed much pyorrhea, see x-ray report and later treatments. Glands negative. Extremities showed slight edema. Heart and lungs negative. Pulses equal and good quality. The abdomen was slightly distended and tympanitic. Uterus well contracted.

*Progress of Case.*—Shortly after admission the patient had a convulsion. Elimination treatment was started, i. e., dry packs, enemata, magnesium sulphate and forced fluids. As a result of this treatment the patient perspired freely. Eight ounces of urine was obtained by catheterization. Four hours later there was another convulsion. A lumbar puncture was done, fluid not under pressure, 20 c.c. of clear fluid removed. Convulsion during the puncture. One hour later a venesection

was done with the removal of 500 c.c. of blood. The blood pressure fell from 178-110 to 136-96. An intravenous of sodium bicarbonate was given.

An hour later another convulsion. Perspiring freely, taking fluids well, semiconscious. Five hours later another convulsion. Five hours later another convulsion. Edema of legs and face increasing. Dull mentally between convulsions. Pulse 120 to 140, irregular. Three hours later venesection, 200 c.c. of blood removed and 5½ c.c. of 25 per cent magnesium sulphate solution given intraspinally. Following the intraspinal injections of magnesium sulphate there was some headache, conscious but still sluggish mentally, slight nausea, restless, eyes staring, and some nystagmus. After an intermission of eighteen hours there was another convulsion. A lumbar puncture was done, 3 c.c. of fluid removed and 5½ c.c. of 25 per cent magnesium sulphate given intraspinally. Patient quite restless, nystagmus, convulsive movements of upper extremities and facial twitchings with occasional fixed gaze in eyes. The following day the patient was very comfortable. Clearer mentally. General condition slowly improving. Edema of face nearly gone, some frontal headache. Passing urine freely.

Condition gradually improved for three days and part of the following day when there was another convulsion after an intermission of 92 hours. Three hours later another convulsion. Three hours later another convulsion followed by involuntary urination and defecation. Three hours later another convulsion. Edema increasing. A lumbar puncture was done, 10 c.c. of clear fluid removed and 5 c.c. of 25 per cent magnesium sulphate was given intraspinally. Convulsions ceased, had a good day, fairly clear mentally. There was motor paralysis of legs which cleared up sixteen hours after the injection. The following day the patient was markedly improved. Edema practically gone. There were no more convulsions. The patient steadily improved. Her blood pressure gradually dropped to 115-80, where it remained. Her mental condition has been clear since the eighth day in the hospital.

On admission the urine showed a heavy cloud of albumin which cleared up gradually. At times the sediment showed hyalin and granular casts, some red blood cells and white blood cells. The spinal fluid showed no growth in 48 hours. There was no increase in cell count. Colloidal gold test was negative. Wassermann blood test was negative. X-ray of teeth showed several apical abscesses.

Thirty-two days after admission the abscessed teeth were removed, without any reaction.

During the course of her convulsions the patient received a limited amount of morphine subcutaneously, not more than eight doses of ¼ grains in all, and never enough to show any effect on respiration. The patient was discharged well, on the thirty-fifth day after admission.

CASE 2.—Admitted to hospital at 4:20 A. M., March 22, 1920. American, white, age twenty. Family history negative. Measles and pertussis as a child. Menses always regular, normal in amount and character, until the present pregnancy. No miscarriages. Present pregnancy—last menstrual period in July, 1919. Two months previous to admission contracted a severe "cold" and never fully recovered from it. Urine examined at that time said to be negative for albumin. Two days ago patient complained of headache and the family physician found albumin in the urine. During the night the patient had severe headache and pain in the epigastrium. Vomited at 2 A. M. today and complained of a blurred vision.

Convulsions started at 4 A. M. Having convulsion on admission at 4:20 A. M. The patient had four severe convulsions within two hours. Each convulsion lasting from seven to nine minutes. Eliminative treatment started. At this stage a physical examination was done. Throat negative. Teeth showed pyorrhea with bleeding from gums. Two crowned teeth. Heart and lungs negative. Abdomen

showed tumor of pregnancy. Fundus 5 cm. below ensiform. Fetus in vertex presentation. Temperature 100; Pulse 120; Respirations 20. Blood pressure 130-70. A catheterized specimen of urine contained a large amount of albumin. Two hours after admission a low forceps delivery was done under ether anesthesia, with small amount of hemorrhage.

*Progress of Case.*—Nine hours after delivery there was a convulsion. An hour later another convulsion which was more severe. An hour later a lumbar puncture was done, 10 c.c. of clear fluid was removed and 5 c.c. of a 25 per cent magnesium sulphate was given intraspinally. In spite of forced fluids, hypodermoclysis and stimulants the patient did not improve. Six hours later the temperature was 107° F., pulse 120; respirations Cheyne-Stokes in character. Two hours later the patient had spells of cyanosis with evidence of edema of the lungs. The general condition grew steadily worse and the patient died eighteen hours later. There were no convulsions after the administration of the magnesium sulphate, but the toxemia could not be overcome. The placenta showed several large, irregular, gray, fine areas along its edge and these, microscopically consisted of placenta tissue which had undergone hyaline degeneration.

*Autopsy.*—There was edema and injection of the brain. The convolutions were flattened. The longitudinal sinus was filled with bloody fluid. On section the ventricles contained a large amount of clear fluid. The stomach and intestines were much distended with gas. The peritoneal cavity contained a moderate amount of straw-colored fluid. The pericardium contained straw-colored fluid in excess. The heart was not remarkable. The lungs were voluminous and dark red, and contained an excess of bloody, frothy fluid. The liver was large with a pale surface containing irregular red blotches. On one section the cut surfaces were yellow-brown with irregular red blotches, the same character as on the surface.

CASE 3.—Woman, age eighteen, married, housewife. Admitted to hospital March 9, 1921, at 10:30 P. M.

*History.*—F. H. negative. P. H. measles, pertussis and parotitis in childhood. Appendicitis four years ago. Otherwise always well. Married one year and eight months. First pregnancy. Catamenia regular every twenty-eight days, duration five to six days. Last menstruation latter part of May, 1920. Bowels regular. Frequent micturition. No headaches, edema, neuralgia or acute infections. Nausea and vomiting each morning.

*Examination on Admission.*—Well developed and nourished woman. Pupils round and equal, react normally to light and accommodation. Many carious teeth. Neck and thorax negative, lungs normal. Heart shows no enlargement. Presystolic murmur at apex, systolic shock. Abdomen presents a normal tumor of pregnancy.

*Progress of Case.*—Patient in first stages of labor, contractions strong and regular. Presentation O. L. A. Fetal heart rate 140 in L. L. Q. The legs show no edema. Right K. J. absent, left K. J. active. Pulse 90—fairly good quality. Temp. 99° F., resp. 22. B. P. 172-100. Cervix fully dilated two and one-half hours after admission. Second stage of labor was three hours in length. Normal delivery with obstetrical ether. A moderate amount of blood was lost during the third stage of labor. Blood pressure after delivery was 152-100. Seven hours after delivery the patient had a convulsion and lost consciousness; twenty minutes later she had another convulsion. Blood pressure following first convulsion was 175-100; after second convulsion 150-80. The third convulsion followed two hours later. A lumbar puncture was done and 10 c.c. of clear spinal fluid was withdrawn and 4 c.c. of magnesium sulphate (25 per cent solution) was given intraspinally. Following this treatment the patient had considerable pain in the back and legs. A subcutaneous injection of morphine gr.  $\frac{1}{4}$  was given. The patient remained

quiet for eight hours. Breathing became shallow and there was some cyanosis. Pulse rose to 120 but remained good quality. Blood pressure 100-50. Oxygen was administered which relieved the cyanosis. Patient was catheterized and eight ounces of cloudy urine were obtained. Two hours later the temperature rose to 104.2° F., pulse 88, resp. 8. A hypodermoclysis of normal saline 700 c.c. and colonic irrigations were given. Two hours later the patient became conscious and the temperature dropped.

The following day the patient showed much improvement. The abdomen was distended, which was accompanied by some discomfort. Twelve hours later the patient developed an eruption on both arms, face, trunk and legs, which caused considerable discomfort. Examination showed a sensory disturbance extending from the lumbar region to both knees, but more on the right. Patient voids involuntarily. The neurologic symptoms were thought to be due to spinal root inflammation and the general excellence of the magnesium solution was questioned. The patient gradually recovered and was discharged in good condition to the Out-Patient Department seventeen days after delivery.

CASE 4.—Woman, age twenty-three, married, housewife. Admitted to hospital September 17, 1920 at 9 A. M.

*History.*—The patient was unconscious on admission and a good history could not be obtained after death from the relatives. The most important facts of her previous illnesses were, that she had had luetic infection six years ago for which she was treated for two years, and that since the infection she has been pregnant three times before this pregnancy. The first pregnancy resulted in a premature macerated fetus. The second in a miscarriage, and the third in a full term normal delivery, but during the last pregnancy the patient's legs were markedly swollen. The Wassermann reactions, whenever taken were always positive.

*Present Pregnancy.*—Her last menstruation was on January 1, 1920, eight and one-half months ago. The patient had occasional nausea and vomiting throughout her pregnancy. As a rule she had loose movements with edema of her legs beginning early in pregnancy. According to her attending physician albumin and casts were found early in her pregnancy. The last three weeks before admission her blood pressure rose to 220 systolic and there was excessive albumin in her urine. Ten days before admission she was given large doses of protiodide of mercury, i. e., four grains three times a day, which was continued until she was admitted to the hospital.

*Physical Examination.*—On admission the patient was unconscious and not in labor. Temperature 98° F., pulse 70, resp. 22. Blood pressure was 190-130. She was well developed and nourished. Face, hands and legs edematous. Pupils irregular, unequal and contracted, there was a corneal scar on her left eye. Heart and lungs were negative. The abdomen showed a full term pregnancy. Vaginal examination showed a conical undilated and fairly firm cervix, the fetal head was high.

*Progress of Case.*—From admission the patient never regained consciousness. Previous to admission she had had four convulsions and after admission had three more, increasing in intensity and duration from 45 seconds to four minutes. After her second convulsion in the hospital which was accompanied by a slight bloody vaginal discharge, the fetal heart-beat disappeared. She was put in a hot dry pack and a spinal puncture was done and 5½ c.c. of a 25 per cent magnesium sulphate solution were given intraspinally. Murphy drip was started but it was not retained. The convulsions ceased after the administration of magnesium sulphate, but the general condition of the patient continued to fail. Five hours after admission the pulse became poor in quality. Stimulation was given and an

intravenous saline injection given after the removal of 18 ounces of blood. The pulse then improved and remained at 76 but weak in quality till the end. The blood pressure was 50 systolic and 20 diastolic, three quarters of an hour before death. Respiration poor and weak 15 minutes before death. Adrenalin 15m were given and a pulmotor used without effect. Patient died at 4 P. M., seven hours after admission.

*Autopsy.*—Uterus on section showed placenta of normal thickness but with hemorrhage between fetal and maternal portions of concealed type, which had separated  $\frac{1}{2}$  of the placenta. Fetus well formed, apparently at term with no abnormality of viscera found. Epiphyses of femur (upper) normal. Liver very large pale gray. Kidneys, large, both capsules stripped from kidneys but adherent to peritoneal tissues. Both kidneys showed healed areas (scar tissue) apparently of old septic origin. A few of these scars on section seemed to pass to medulla, they were mostly cortical. No pus or active foci found. Cortices pale, of normal thickness. Medullae somewhat cyanotic, pelvis normal. Adrenals, large, but no congestion. Lungs, freely movable, some edema in lower lobes, no scars, no enlarged bronchial nodes. Heart, large in systole, no myocardial disease. Aorta, hemoglobin stained with slightly elevated patches of yellowish color, extending down as far as coeliac axis, more numerous in ascending aorta. Other great vessels normal. Head not examined. Other organs apparently normal. Diagnosis: Chronic nephritis, syphilis, antepartum toxemia of pregnancy, with convulsions, antepartum concealed hemorrhage from premature separation of placenta.

#### REPORT ON LITERATURE

Einar, H.<sup>19</sup> Two Cases of Puerperal Eclampsia with Injection of Magnesium Sulphate Intraspinaly.

CASE 1.—The patient, a woman of forty, after three severe convulsions, had a forceps delivery. Six hours after birth, frequent, violent convulsions recurred. Nineteen and one-half hours after birth, a spinal puncture was performed and 6 c.c. of a 25 per cent solution of magnesium sulphate was injected. Results were apparently instantaneous. The temperature, pulse, and respiration improved quickly in the course of the day. There were no new attacks.

CASE 2.—A twenty-six year old primipara had eclampsia in the seventh month of pregnancy. After three convulsions, 4 c.c. of a 25 per cent solution of magnesium sulphate was given intraspinaly. The effects were not so clear, rapid or good, as in the first case. The convulsions were partially controlled.

Guggisberg,<sup>20</sup> reports two cases.

CASE 1.—A primipara of twenty-four years was seized with severe eclampsia at the end of her pregnancy. A cesarean operation was performed, with great loss of blood, and at the close of the operation, 10 c.c. of a 15 per cent solution of magnesium sulphate were injected into the lumbar sac. Soon after, a series of attacks began, continuing every 5 to 10 minutes until thirty had occurred. The attacks were limited principally to the upper extremities and the face. Two hours after injection reflexes of the lower limbs were almost absent. The patient died, with increasing weakness of the heart. The necropsy showed pronounced myocardiac fattening and subepicardial hemorrhage.

CASE 2.—After giving normal birth to a child, the patient, a bipara, was seized with convulsions. She was carried into a dark room and treated according to Stroganoff's method, with chloralhydrate, and with morphine and venesection (400 c.c.). After the sixth attack, lumbar puncture was done and 6 c.c. of a 15 per cent magnesium sulphate solution was injected. The patient relaxed and slept. Three



days later the patient had another attack, and died. The necropsy showed acute myocarditis, subepicardial hemorrhage, pneumonia, and renal and hepatic fattening.

Heimann.<sup>21</sup> Therapy in Eclampsia. Mention is made of the use of magnesium sulphate by Rissmann, but the writer apparently has had no experience with it, and refers to it as a method to be used only in case of last resort.

Hugel.<sup>22</sup> Treatment of Eclampsia with a High Per Cent Sugar Solution. The writer, in reporting on the intravenous injection of sugar solutions, as a substitute for the saline solution (a war method adopted by him for the treatment of eclampsia in pregnancy) refers to the use of magnesium sulphate and other substances which prevent coagulation of the blood and check convulsions, they are less physiologic than the sugar solutions.

Kaas, Johan.<sup>23</sup> A Case of Puerperal Eclampsia Treated with Magnesium Sulphate. Two and one-half hours postpartum, the patient suffered a sudden convulsive attack, two more followed about fifteen minutes apart. The patient was given 10 c.c. of a 25 per cent solution of magnesium sulphate subcutaneously. Three and one-half hours later a similar injection was given. No convulsive attacks occurred thereafter, and the patient was discharged well.

Von Miltner.<sup>24</sup> The writer reports on the intramuscular injection of magnesium sulphate, in connection with the use of luminal, but does not mention intraspinal injection.

Mittweg, Wilhelm.<sup>25</sup> The writer, who is a staff assistant at the school for midwives at Osnabruck, of which Rissmann is the director, reports nine cases of eclampsia and discusses the treatment recommended by the institute. He states that magnesium sulphate is sometimes used in combination with luminal in the form of a rectal, subcutaneous or intramuscular injection, but he makes no mention of intradural injections. Literature\*

Rissmann.<sup>26</sup> New Methods of Treatment in Eclampsia Convulsions. In the author's opinion the dangers of this therapy are overrated. He discusses the comparative value of magnesium sulphate given intraspinally and the use of luminal, morphine and chloralhydrate. He regards the therapy as one to be employed in severe cases.

Rissmann.<sup>27</sup> Is Eclampsia Curable by Injections into the Spinal Cord? A thirty-four year old woman had twelve convulsions within thirteen hours. The last came on when the needle was in the lumbar sac. A 15 per cent solution of magnesium sulphate was used for injection. There were no more convulsions and the patient was normal three days later.

## DISCUSSION

Because of their severity the above four cases were chosen for treatment with magnesium sulphate by the intrathecal route. The salt was not used until a thorough eliminative treatment had failed to control the convulsions. After each injection of magnesium sulphate the convulsions immediately ceased, and the minimum time in which convulsions were controlled was 18 hours.

One patient (Case 2) was in coma when admitted to the hospital. Her condition seemed hopeless from the beginning. She did not re-

\*Schroeder, Knud: Om Behandling af Tetanus (Hospitallidende, No. 27, 1913.)  
— : Om Behandling af Chorea minor med Sulfas magnesicus (Ugeskrift for Læger, No. 36, 1913).

Zwiefel: Döderleins Handbuch der Geburtshilfe, 1916.

gain consciousness before death. However, the magnesium sulphate controlled the convulsions.

The necropsy findings in Case 4 show that the patient had previously suffered considerable damage in several organs which probably brought about her death.

The convulsions in eclampsia are presumably of cerebral origin; but, to our knowledge, it had not been definitely established just where and how they develop.

The action of magnesium is supposed to be due to its penetration into the space between the terminal processes of the neurons (Sherrington's synaptic membrane) whereby the contact is cut off.

The amount of magnesium sulphate to be used is 1 c.c. of a 25 per cent solution to each 25 pounds of weight. With larger doses of this salt the respiratory center is depressed and respirations may cease, but the heart action and pulse are unaffected. In cases of respiratory failure following an overdose of magnesium sulphate, 10 c.c. of a 25 per cent calcium chloride solution given intravenously will have a balancing action on the magnesium salts. When respiratory failure occurs, artificial respiration should be started immediately and continued until normal respirations are established.

The results obtained in the four cases we worked on have been satisfactory. We feel that this therapy should be tried in severe cases of eclampsia.

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29 PEARL STREET.

# A PRELIMINARY REPORT ON THE INTRAVENOUS USE OF MAGNESIUM SULPHATE IN PUERPERAL ECLAMPSIA\*

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IN MAY, 1924 one of the internes, Dr. E. Bogen, suggested the use of magnesium sulphate intravenously for the control of eclamptic convulsions. Having in mind the sedative action of magnesium sulphate on the nerve cells as reported by Meltzer and Auer in the American Journal of Physiology in 1904, as well as the intraspinal use of magnesium sulphate for the control of tetanic convulsions, we thought it worth while to give it a trial. Our experience in the few cases here reported has been so uniformly successful, that we feel it is worthy of further and more extensive trial and we are making this preliminary report in the hope that more extensive experience may bear out our impression that in the intravenous administration of magnesium sulphate, we have at our disposal a means, not only of controlling the convulsions of eclampsia, but an efficient treatment of the toxemia itself.

The treatment as developed at the Los Angeles General Hospital, consists of the intravenous administration of 20 c.c. of a 10 per cent solution of magnesium sulphate as soon after the first observed convulsion as possible. Eliminative measures, such as phlebotomy, stomach lavage, administration of castor oil, colonic flushings with glucose and soda are carried out as in the treatment of any toxemic condition. We are coming to feel more and more strongly, however, that the best results can be obtained by the least handling of the patient, consistent with obtaining the desired results.

The cases herewith reported are in most part from the obstetric services of Dr. L. G. McNeile, and of the writer, at the Los Angeles General Hospital. The cases were under the direct supervision of the resident obstetricians, Drs. L. J. Kaffesieder and H. White, to whom credit is due for the carrying out of the treatment. There are three cases included from the private practices of members of the attending staff.

We have now to report ~~seventeen cases~~ of eclampsia, ante-, intra-, and postpartal, which have received this treatment, with but one maternal death. It is to be remembered that these are all cases of the profoundly toxic type, having convulsions, and in coma when first seen, and most of whom have had little or no antepartum care.

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\*Read at the meeting of the Los Angeles Obstetric Society, Oct. 14, 1924.

CASE 1.—Hosp. No. 211825. Para i, twenty-six yrs., eight months pregnant, in almost continuous convulsions on admission. Two gr.  $\frac{1}{4}$  doses of morphine sulphate given. Not in labor; Bl. Pr. 180. Given 20 c.c. of 10 per cent solution of magnesium sulphate intravenously on admission. Venesection of 500 c.c. 1000 c.c. of normal saline given by hypodermoclysis. Three hours later 10 c.c. of 10 per cent magnesium sulphate intramuscularly, 1000 c.c. of normal saline by hypodermoclysis repeated. Twelve hours after admission patient developed labor pains, and five hours later delivered a macerated eight months fetus. There was no further convulsion after the first injection of magnesium sulphate and recovery was uneventful.

CASE 2.—Hosp. No. 213762. Para i, eighteen yrs. Comatose when admitted, said to have had five convulsions at home. About  $7\frac{1}{2}$  months pregnant, not in labor. Bl, Pr. 150. Had one convulsion, immediately after being admitted. Twenty c.c. of 10 per cent solution of magnesium sulphate given intravenously during convulsion, which ceased immediately. Two hours later, patient was able to take orange juice by mouth. Two hours after admission, 10 c.c. of 10 per cent magnesium sulphate repeated intravenously; 1000 c.c. of normal saline by hypodermoclysis, patient conscious all the time. On admission there was a total anuria on catheterization for six hours. Fifteen hours after admission, developed a bloody vaginal discharge. On the supposition that a premature separation of placenta had occurred, membranes were ruptured artificially. One hour later 20 c.c. of 10 per cent magnesium sulphate given intravenously, because of extreme restlessness of patient. One and one-half hours later, spontaneous delivery of a stillborn premature infant. Recovery of mother uneventful. One of the attending obstetricians saw this patient on admission and considered her to be a hopeless case. This is one of the General Hospital series, in which any local obstetrical interference was carried out, and that only rupture of the membranes because of premature separation of placenta.

CASE 3.—Hosp. No. 212521. Para ii, age forty-two. Was in convulsions on admission. She was given 25 c.c. of 10 per cent magnesium sulphate intravenously. Morphine gr.  $\frac{1}{2}$  in  $\frac{1}{4}$  gr. doses. One and a half hours later, 1000 c.c. normal saline by hypodermoclysis. Full term, not in labor. Had a similar attack 16 years ago. About 18 hours after admission, given Tr. veratrum viride,  $\mathfrak{M}$  xv by hypo; this was followed by a drop in the blood pressure from 210/80 to 96/68. She was then given adrenalin,  $\mathfrak{M}$  xv, which brought her blood pressure up to 112/78. Two hours later 10 c.c. of magnesium sulphate repeated, because of marked restlessness. The patient never came out of her coma, fully, and died undelivered of pulmonary edema twenty-four hours after admission and about six hours after administration of veratrum viride. There was no further convulsion after the first dose of magnesium sulphate.

This was the only death in the series, and in view of the drop in blood pressure following the veratrum, we feel that the pulmonary edema which closed the scene, was due as much to the veratrum, as to the toxemia itself.

CASE 4.—Hosp. No. 212813. Para i, age nineteen. In continuous convulsions on admission. At term, not in labor; 25 c.c. 10 per cent magnesium sulphate, followed by 1000 c.c. normal saline by hypodermoclysis. Ten hours after admission, 10 c.c. magnesium sulphate given, because of restlessness. Thirty-six hours after admission, spontaneous delivery of normal male infant. Recovery uneventful.

CASE 5.—Hosp. No. 212754. Para i, age eighteen. In convulsions on admission; at term, in labor, pains every ten minutes. Two convulsions after admission, 25 c.c. of 10 per cent magnesium sulphate intravenously, and gr.  $\frac{1}{4}$  morphine sulphate by hypo. Patient continued in slow labor, and twenty-four hours after first injection had another convulsion while in 2nd stage labor. Magnesium sulphate 15 c.c.

given intravenously, and morphine sulphate gr.  $\frac{1}{4}$ . Four hours later, delivered spontaneously a normal infant. No obstetrical interference. Recovery uneventful.

CASE 6.—Hosp. No. 212431. Para vi, age thirty-five. In convulsions on admission. At term, not in labor; 20 c.c. of 10 per cent magnesium sulphate intravenously. Morphine sulphate gr.  $\frac{1}{4}$  per hypo; 500 c.c. of blood by phlebotomy, two hours later, 1000 c.c. of saline by hypodermoclysis, and another gr.  $\frac{1}{4}$  of morphine sulphate. Seven hours after admission convulsions recurred; 10 c.c. magnesium sulphate were then given intravenously, and convulsions ceased immediately, and did not recur. The following day she delivered spontaneously a  $3\frac{1}{2}$  pound stillborn infant. Mother's recovery uneventful.

CASE 7.—Hosp. No. 211127. Para ii, age twenty-one. Came in postpartum, in severe convulsion. Twenty c.c. of 10 per cent magnesium sulphate intravenously, given immediately, and gr.  $\frac{1}{2}$  morph. sulph. by hypo. Fisher's solution, 700 c.c. by proctoclysis. Patient continued to have convulsions. Two hours later, 15 c.c. of 10 per cent mag. sulph. intravenously and 700 c.c. 5 per cent glucose intravenously. Seven hours after admission patient was still having convulsions, and 15 c.c. of mag. sulph. were again given intravenously, and morph. sulph. gr.  $\frac{1}{4}$  given by hypo. Phlebotomy of 500 c.c. Convulsions still continued, but about 36 hours after admission the coma began to clear, and the convulsions ceased. Forty-eight hours after admission, patient was conscious and made an uneventful and complete recovery from this time.

CASE 8.—Hosp. No. 210014. Para i, sixteen years of age. Delivered at 6 A. M., 4:30 P. M. convulsions began, recurring at frequent intervals until 6 P. M., 25 c.c. of 10 per cent mag. sulph. given intravenously; convulsions ceased immediately; 500 c.c. of 5 per cent glucose given intravenously and 1000 c.c. of normal saline by hypodermoclysis. Three hours later, 15 c.c. of mag. sulph. again given intravenously because of slight muscular twitching. No further convulsions, recovery uneventful.

CASE 9.—Hosp. No. 212332. Para ii, age nineteen. Admitted two days postpartum and in convulsions; 20 c.c. of mag. sulph. given intravenously, morph. gr.  $\frac{1}{4}$  by hypo. Phlebotomy of 500 c.c. Convulsions ceased. Four hours later 500 c.c. normal saline by hypodermoclysis. Recovery uneventful.

CASE 10.—Hosp. No. 213687. Primipara, age twenty-six. Admitted Aug. 8, 1924; 5:15 P. M.; pains began 18 hours before admission, two convulsions before admission, Bl. Pr. 250. Had already been given morph. sulph. gr.  $\frac{1}{4}$ ; 7 P. M. given 25 c.c. of 10 per cent mag. sulph. intravenously. No further convulsions. Pains began again at 2 A. M.. Delivered spontaneously of living baby at 8:15 A. M. Clear mentally after delivery. Uneventful convalescence.

CASE 11.—Hosp. No. 214722. Admitted Sept. 1, 1924, 10:50 A. M. Para i. Had ten convulsions before admission. Had been given 20 m veratrum viride before admission. When admitted was in coma and had marked general edema. At 11:05 A. M. Bl. Pr. 150/120, was given 20 c.c. 10 per cent mag. sulph. intravenously. At 11:20 A. M. Bl. Pr. dropped to 80/50, probably as result of veratrum viride given before admission, adrenalin m<sub>x</sub> given, Bl. Pr. returned to 150/100 and some what later 130/100, where it remained all afternoon. At noon gastric lavage and colonic flushing with soda solution: 4:40 P. M. patient restless and crying; 20 c.c. of mag. sulph. repeated intravenously; patient quieted and went to sleep. 5 A. M. Sept. 2, 1924, patient awake and clear mentally; 1:30 P. M. membranes ruptured and bag inserted. Bl. Pr. 150/100. 9:30 P. M. labor started, 11:25 P. M. spontaneous delivery of living baby, convalescence uneventful.

CASE 12.—Private case of Drs. L. G. McNeile and J. Vruwink and reported by them. Para iii. Had had mild toxemias but no eclampsia in both her previous pregnancies, which ended in spontaneous deliveries of living babies. Due Nov. 11, 1924. July 29, 1924, Bl. Pr. 120/80 with edema. Treatment of toxemia began. Aug. 26, 1924, Bl. Pr. 195; patient sent to hospital. Aug. 29, beginning at 9 P. M. had three convulsions in rapid succession. 11 P. M. 25 c.c. of 10 per cent mag. sulph. intravenously. Two convulsions after injection. Aug. 30, 12:15 A. M. Art. rupture of membranes, 3:45 A. M. 25 c.c. of 10 per cent mag. sulph. following two more convulsions, 6 A. M. breech extraction of premature fetus. No further convulsions, convalescence uneventful.

CASE 13.—Seen by writer in consultation with Dr. C. W. Anderson, through whose courtesy I am permitted to include it in this series of cases. California Lutheran Hospital No. 83696. Para i, twenty-nine years of age, admitted Aug. 18, 1924, about 5½ months' pregnant, and in coma on admission at noon. Had had three convulsions prior to entrance. Bl. Pr. 174/90. At 12:45 P. M. seven ounces of urine obtained by catheter. 1:45 P. M. convulsion; 2:45 P. M. convulsion; 4:40 P. M. convulsion. 4:45 P. M. given first dose of mag. sulph. 20 c.c. of 10 per cent solution intravenously. Croton oil m2 on tongue; 8:30 P. M. Bl. Pr. 170; Phlebotomy of 600 c.c. 8:50 P. M. seventh and last convulsion; 9:20 P. M. 20 c.c. mag. sulph. intravenously; Aug. 19, 1924, 2:20 A. M. morph. sulph. gr. ¼. 2:50 A. M.; complains of tongue feeling sore; 6:50 A. M. talking plainly—10:30 A. M. colonic flushing, glucose 5 per cent, soda bicarb 2 per cent. 5 P. M. glucose and soda colonic flushing. Urinary output for 24 hours, 24½ ounces. Aug. 20, 1924, 8:30 A. M. glucose and soda colonic flushing, urinary output 54 ounces measured, not including considerable lost with bowel movements. Patient perfectly clear for first time since admission to hospital. Aug. 21, glucose and soda flushing at 4:30 P. M. Urinary output for 24 hours 67 ounces. From this time on patient was apparently well of her eclampsia, and *her pregnancy was undisturbed*. She had, however, toxemic symptoms, such as occasional blurring of vision, albumin in her urine, which had markedly diminished from 11 gms. per liter to what the laboratory termed a "moderately heavy trace"; her blood pressure remained high, from 145-154. In other words, she had been converted from a case of frank and severe eclampsia, into a preeclamptic toxemia. We had thought that she had a dead fetus as she had felt no movements for about ten days before onset of eclampsia, there had been no appreciable increase in size of the uterus and the fetal heart had not been heard; so we expected her to go into spontaneous premature labor. On Aug. 26, 27 and 28 the fetal heart was definitely heard and counted at 160 by the resident, and both Dr. Anderson and myself also heard the heart tones. On Aug. 31 her blood pressure rose to 170, and both Dr. A. and I felt that we would not be justified in attempting to carry her any further. So a bag was inserted to induce labor. She had no further medication, other than two doses of morph. sulph. gr. ⅓ in 2 c.c. of 50 per cent mag. sulph. as analgesics during her labor. Her delivery was not completed until Sept. 2, at 5:20 P. M., when a dead premature infant was delivered spontaneously, 55 hours after introduction of bag. At no time were there any convulsions during labor, her nervousness being controlled by hypodermics of morphine and magnesium sulphate. After her delivery, she had an uninterrupted convalescence, being discharged from the hospital on Sept. 8, 1924. She still carried albumin but other than this she was entirely well. Since her return home, Dr. A. informs me, the albumin has entirely disappeared.

I have reported this case in some detail as, to my mind, it is one of the most interesting of the cases, in that with two intravenous injections of magnesium sulphate, the eclamptic convulsions were stopped

and the patient's pregnancy was carried on for two weeks longer with a living fetus. It suggests the possibility of combating the remaining toxemic condition with intravenous magnesium sulphate treatment, which at this stage of our experience we did not feel justified in attempting. In studying her urinary output, we find that in the first twenty-four hours after the magnesium sulphate, she excreted 24½ ounces, the second twenty-four hours, over 54 ounces and the third twenty-four hours, 67 ounces. It would seem, then, that a partial kidney block was overcome by the action of magnesium sulphate.

CASE 14.—Hosp. No. 215-735. Admitted 10 A. M., Sept. 23, 1924. Primipara, age fifteen. About 8 months' pregnant, not in labor. Had five convulsions before admission. Bl. Pr. 180/160. Was in coma and had three convulsions before she was given the magnesium sulphate. 11:5 A. M. given 20 c.c. of 10 per cent magnesium sulphate intravenously; 11:10 A. M. convulsions stopped but patient was vomiting quantities of foul vomitus; gastric lavage done and three ounces of magnesium sulphate solution left in stomach. She then had four more convulsions and at 1:40 P. M. was again given 20 c.c. of 10 per cent mag. sulph. intravenously; during the afternoon she had four more convulsions. I saw the patient at 4:30 P. M., she was in deep coma, was markedly edematous and was apparently in a desperate condition. At 5:15 P. M. she had another dose of 20 c.c. of mag. sulph. intravenously and had one more convulsion after the last dose of magnesium sulphate. She went into labor at 7 P. M.; 8 P. M. membranes ruptured, and at 9:25 P. M. she was spontaneously delivered of a stillborn child. On Sept. 24, she was in a semicomatose condition all day; and at night, in a semicomatose delirium, she got out of bed; on the night of Sept. 25, she was partially rational, and on the morning of the 26 she had entirely cleared mentally. During the entire time of her coma she passed large quantities of urine, which could not be measured, as it was passed involuntarily. The edema disappeared rapidly. This patient had twelve observed convulsions within six hours and at least five before admission to hospital, in all seventeen in about nine hours; she received 60 c.c. of 10 per cent magnesium sulphate in six hours before the convulsions were controlled, and was not entirely clear mentally until about 70 hours after beginning of treatment. She received no other treatment than the magnesium sulphate and made an uneventful convalescence, being discharged from the hospital on Oct. 6.

CASE 15.—Hosp. No. 215-886. Admitted Sept. 25, 1924, 10:45 P. M. Age eighteen, primipara, delivered at 5:20 P. M., before admission to hospital. Two minutes after delivery had first convulsion, had had several more before being brought to hospital, including one convulsion in ambulance. Bl. Pr. on admission 166/92. At 11 P. M. was given 20 c.c. of magnesium sulphate intravenously. By midnight, patient quite rational. Gastric lavage done at 1:30 A. M. Sept. 26, 2 ounces magnesium sulphate by mouth; 4 A. M. colonic flushing, glucose and soda; 4:20 A. M. convulsion; 6 A. M. patient conscious, mag. sulph. solution 2 drams by mouth at 6 A. M., 11 A. M., 2 P. M. and 10 P. M. Patient cleared up rapidly, having no further convulsion. She was discharged from the hospital Sept. 29, at her own request. She had but one intravenous injection of magnesium sulphate, having had several postpartum convulsions before admission to hospital and only one convulsion after institution of the treatment. No further treatment given except magnesium sulphate by mouth.

CASE 16.—Hosp. No. 215-980. Admitted 5:15 P. M. Sept. 27, 1924. Age nineteen. Primipara. Was delivered at home at 5 A. M. Had had two convulsions before

delivery, which was a forceps delivery. She had a complete tear of the perineum into the rectum. She had had repeated convulsions all day and doctor in attendance had used three cans of ether and four ounces of chloroform in attempt to control convulsions. She had also had two hypodermic injections, presumably of morphine. *Veratrum viride* had likewise been given. On admission her Bl. Pr. was 60/40, there was a large quantity of mucus in her throat and she was very restless, throwing herself about the bed continuously. She was given adrenalin,  $\text{Mx}$  and her Bl. Pr. went up to 110/60. At 5:40 P. M. 20 c.c. of 10 per cent mag. sulph. given intravenously, at 7:10 P. M. patient still very restless and 25 c.c. of mag. sulph. repeated. At 10:30 P. M. 20 c.c. of mag. sulph. Sept. 28, 1924, 1 A. M. morph. sulph. gr.  $\frac{1}{4}$ , by 7 A. M. she was able to take liquid by mouth and was given one and one-half ounces of magnesium sulphate in solution. She had no convulsion after admission to hospital, but recovered from her eclampsia only to develop a psychosis, which the psychiatrists call a *dementia precox*. She is still in the hospital under treatment for her mental condition. I think we are justified in claiming her as a recovery as far as her eclampsia is concerned. That she had had an operative delivery and other medical treatment is true, but that she survived the bombardment of operative attack, hypodermic medication and chloroform and ether anesthesia for twelve hours on top of her severe toxemia, is to my mind a tribute either to her powers of resistance or to the effectiveness of the eliminative powers of intravenous magnesium sulphate. If she recovers from her psychosis, she still will have to have a repair of her complete laceration.\*

CASE 17.—Private case of Dr. J. C. Irvin and reported by him. Age twenty-six, para ii. Had had eight eclamptic convulsions with her first pregnancy. At that time she was delivered by vaginal hysterotomy. During her second pregnancy she was kept on a protein-free diet from the third month by her family physician. At 8½ months she began having severe headaches and blurring of vision. Eye examination revealed no changes in fundus. The following day she had a convulsion about 1 P. M. Bl. Pr. 160/90, convulsions at 3, 4, and 6 P. M. Patient seen by Dr. Irvin at 8 P. M. and she was given 2 c.c. of 50 per cent solution of magnesium sulphate intravenously. Patient quieted very much after first dose of magnesium sulphate and had no further convulsions. She was given a second dose of 2 c.c. one hour later. At 11 P. M. a classical section with sterilization was done. Twelve hours after operation patient was entirely rational and in good condition. An uninterrupted recovery was made.

In this case, the magnesium sulphate was used in much greater concentration than we have been using it, but the quantity of the drug per dose was only one-half of what we had been using. The section, I presume, was done because the patient was near term, not in labor, with a long cervix, and had already been subjected to a vaginal section, and also because of the desirability of sterilizing such a patient.

#### SUMMARY OF CASES

There have been eleven antepartal cases, one intrapartal and five postpartal. Of the ante- and intrapartal cases, one died undelivered; in one, membranes were ruptured artificially, with spontaneous delivery of baby; in one, at term, membranes were ruptured and bag inserted to induce labor, delivery completed spontaneously; in one, a six months' pregnancy, labor was induced by the bag after recovery from eclampsia, with spontaneous delivery of fetus; in one, a clas-

\*This woman finally recovered completely from her psychosis.



sical section was done after convulsions were controlled; and in seven, spontaneous delivery without any obstetric interference.

As to the convulsions, ten were in convulsions on admission, with number of attacks unknown, one had had two convulsions; one had had three, one had had four, two had had six, one had had eight, and one had had ten convulsions before the treatment was instituted. Ten had no further convulsion after the first intravenous injection, four had one convulsion after first injection; one had two convulsions after first injection and two after second; one had four after first, four after second and one after third injection, this patient having had seventeen known convulsions before they were controlled. Three patients had but one intravenous injection of 20 c.c., 25 c.c. and 20 c.c. respectively; eight had two injections of 20 and 10 c.c.; 25 and 10 c.c.; 25 and 10 c.c.; 25 and 15 c.c.; 25 and 15 c.c.; 20 and 20 c.c.; 25 and 25 c.c.; 20 and 20 c.c.; of 10 per cent solution respectively; one had two injections of 2 c.c. of 50 per cent solution; and five had three injections of 20, 10 and 20 c.c.; 20, 10 and 10 c.c.; 20, 15 and 15 c.c.; 20, 20 and 20 c.c.; and 20, 25 and 20 c.c. of 10 per cent solution respectively. Of the eleven babies which were delivered after treatment was instituted, there were five living, one full term stillborn and five premature stillborn. It will be noted that the first cases were given considerable other treatment, such as phlebotomy, saline infusion, colon flushings, etc., while the later cases, Nos. 10 to 17, had very little other treatment and were disturbed as little as possible. None of these had any hypodermoclysis and very little morphine was used in these later cases. This makes seventeen cases, with one maternal death (Case 3), a mortality of 5.88 per cent.

After this paper was completed, Dr. E. Bogen called my attention to the records of the first three cases in which magnesium sulphate had been given intravenously, hospital Nos. 207157, 209677, and 210014, which had been overlooked. Of these, two made good recoveries and one died. The one who died, the second one to receive magnesium sulphate, came in, in convulsions, and there were three convulsions before she had the magnesium sulphate; the first dose being 30 c.c. of a 3 per cent solution; nine hours later she received a second intravenous injection, this time of 20 c.c.; she was in very bad condition, her pulse varying from 136 to 160 and irregular for several hours; three-quarters of an hour after her last injection, a Scanzoni forceps delivery was done, a dead baby being delivered. Five hours after the delivery, patient had not come out of her coma, had another convulsion and died. This patient did not receive enough of the magnesium sulphate and in addition a difficult forceps extraction was done, at the height of her toxemia.

One of the others had had five convulsions before admission, and two convulsions in the ward before first injection of magnesium sul-

phate, no further convulsions. A bag was inserted to induce labor and twelve hours later she had a spontaneous delivery of a stillborn child. Uneventful recovery.

The third one had her first convulsion fourteen hours after a spontaneous delivery of a living child. She had three severe convulsions within an hour and then continuously. Her first dose of magnesium sulphate was 30 c.c. of a 7 per cent solution. She had no further convulsion, but fifteen hours later, she was given another injection of 15 c.c. of a 6 per cent solution because of muscular twitching.

We do not feel that these cases should be included as they did not receive the proper dosage and the treatment was not carried out as it has since been developed. Especially is this true of the fatal case which did not have the dosage now used, and which was *operated on at the height of her toxemia*. If we include these cases, however, there are twenty cases with a mortality of 10 per cent. The last fourteen *consecutive* cases were without mortality.

We have made a careful search of the literature in an attempt to learn if there has been any previous use of magnesium sulphate intravenously in eclampsia and also to find a logical explanation of its action. The only reference we have been able to find is an article on "Diagnosis, Prognosis and Treatment in Nephritis" by Fisher, published in the *Detroit Medical Journal*, June, 1916. In this article, he discusses the case of a patient who had a postpartum eclampsia. Fisher says, "The administration of sodium bicarbonate and of magnesium sulphate in several small doses represented a first attempt to meet the edema of her brain, that of the kidneys as expressed in her urine, and that of her tissues generally, as observed in her slight general edema." Not succeeding completely, after trying several other measures, he finally gave her intravenously, 250 c.c. of a 2 per cent solution of magnesium sulphate; this was repeated twelve hours later as "she again became drowsy and complained of headache and nausea. This was an indication to us that her brain swelling was again increasing, so a second dose of magnesium sulphate was given as before." While this observation is the basis of our work, the method of administration is very different. To take one-half hour to make an injection of 250 c.c. is feasible in a patient who is drowsy or comatose, but to do the same thing to a patient having severe convulsions in rapid succession would be rather difficult. The method as developed at the General Hospital of giving 15 to 25 c.c. of a 10 per cent solution, is very readily done in the period of relaxation immediately following a convulsion.

As stated in the beginning, our first idea was to control the convulsions by the paralyzant or sedative effect on the voluntary muscles. We were at first concerned as to whether we might not get a respiratory paralysis, but have not noted *any* deleterious effect in any of the

cases. I also believe that we get a depletant effect by withdrawing of fluids from the tissues into the blood stream, thus reducing the edema. In reducing the edema of the brain the coma clears up more rapidly and the increase of the watery elements of the blood increases the urinary output and relieves the patient of her toxins. Our results in this small series of cases have been so uniformly good that we feel that in the intravenous use of magnesium sulphate we have a method of treatment which yields results far better than any we have made use of heretofore. Our previous mortality in this class of severe eclampsies had been about 30 per cent, while in this series it was 5.8 per cent.

Without attempting to discuss the causes of eclampsia, I believe that the urgent indications for treatment are fairly definite, (1) to antidote as effectively as possible the effect of the toxins on the central nervous system; (2) to stimulate elimination of the toxins. Does the intravenous use of magnesium sulphate fulfill these indications? I believe it does.

As to its effect on the convulsions—in no case have we been unable to control the convulsions, apparently the only question being to get sufficient of the drug into the circulation to accomplish this end. This we have been able to do without any of the deleterious effects which some of the early investigators feared. In seeking an explanation of this anticonvulsive effect of the magnesium sulphate we find a considerable literature has been developed since Meltzer and Auer's original experiments were published in the *American Journal of Physiology*, October, 1905, and the *Medical Record* of Dec. 16, 1905 (quoted by Blake, *Surg. Gyn. and Obstet.*, 1906, ii, p. 541). As a result of his experiment, Meltzer concluded that "the action of the magnesium salts is distinctly inhibitory and also selective for nervous tissue." Blake, after quoting the above results of Meltzer's work, reports on the use of magnesium sulphate in production of anesthesia for surgical operations and also in the treatment of tetanus (intraspinaly).

In regard to the tetanus, Blake claims "(1) A marked effect in restraining the convulsions and relieving pain, thereby conserving strength and preventing excessive metabolism and heat production. (2) That spasm of muscles of mastication and deglutition is at least lessened, thereby permitting feeding. (3) That its action is continued for a considerable period, (29 to 34 hours), without depressing action on the heart muscle; and finally, in one case at least, that repeated injections produced no harmful effect, except the inhibition of the bladder and the consequent need for catheterization." (Intraspinal use.) In the *Journal of the Am. Med. Assn.* for Oct. 14, 1916, Peck and Meltzer report on the intravenous use of magnesium sulphate for the production of anesthesia, and conclude, "The employment of intravenous injections of magnesium salt as an anesthetic may prove to be indeed a practicable and advantageous method, be-

cause, in the first place, it may cause simultaneously a *moderate relaxation of the muscular mechanism*, and secondly, because the untoward effects can be rapidly reversed by a careful administration of a solution of calcium chloride." In our work we were prepared with a solution of calcium chloride to combat any respiratory paralysis, but as already noted, fortunately, did not observe the slightest respiratory embarrassment in any of the cases.

In the *American Journal of the Medical Sciences* for March, 1923, Weston and Howard, basing their work on the reports of Meltzer and Auer, report on their use of magnesium sulphate as a sedative in excited states. They found that "In 82.7 per cent of the cases, the sedative action was prompt, the patient becoming quiet after fifteen or thirty minutes and sleeping from five to seven hours. In a few instances the patient became quiet but did not sleep. The effect persisted for from five to ten hours."

Without going any further into the extensive literature which has developed in this subject since Meltzer and Auer's original work I believe the above-quoted reports furnish an explanation of the anti-convulsive and sedative action of magnesium sulphate. As to the second therapeutic indication, viz.: elimination of the toxins, the only explanation of this action we have been able to find in the literature is in the article by Fisher, already referred to, in which he explains its therapeutic effect in this respect.

The coma usually clears comparatively rapidly, although in some of the cases it was forty-eight to seventy-two hours before the patients were entirely clear. I believe this comparatively rapid clearing-up of the coma to be due to a reduction of the edema in the brain. By the increase in the watery constituents of the blood, diuresis is increased and toxins eliminated. In other words, the magnesium sulphate in the blood stream, in addition to its anticonvulsive and sedative action, acts as it does in the bowel, namely, to withdraw tissue fluids, and instead of watery bowel movements, we have increased diuresis. This impression I have gained in particular from Case 13, in which, after the second injection of magnesium sulphate, the convulsions ceased, the coma gradually cleared; and the urinary output was  $24\frac{1}{2}$  ounces the first twenty-four hours, over 54 ounces the second twenty-four hours and upwards of 67 ounces the third twenty-four hours, without any considerable increase in fluid intake, and *with rapid diminution of the visible edema*. This, with the pregnancy uninterrupted.

The study of the other cases, in this particular, was not so significant, as they were all either postpartal or the delivery was completed within a short time after the treatment was begun.

As a result of our experience in this series of cases I have become more firmly convinced in my belief, which has been growing stronger

in the last few years, that eclampsia is essentially a medical complication of pregnancy and as such should be treated medically. On our services the pregnancy is not interfered with during the treatment of the eclampsia, except for some urgent obstetric indication. It has not been necessary to interfere with any of the cases, except the one with eclampsia at 5½ months and labor was induced only after the active eclampsia was entirely overcome, though the toxemic condition still existed.

From our experience, I am disposed to try the intravenous use of magnesium sulphate in cases of preeclamptic toxemia which do not improve under the usual treatment, in the hope that the toxemia can be controlled and the pregnancy carried to spontaneous labor without the supervision of an eclamptic attack. There has been observed no effect on the labor, either of hastening its onset or of interfering with its progress after it starts.

#### CONCLUSIONS

(1) By the intravenous use of magnesium sulphate the convulsions of eclampsia can be controlled and the coma cleared by a sufficient dosage.

(2) The intravenous use of magnesium sulphate reduces edema and promotes diuresis, thus eliminating the toxins.

(3) Other eliminative measures, such as catharsis, phlebotomy, lavage, and colonic flushings may be used as adjuvants; however, as our confidence in the magnesium sulphate has increased, we have gradually reduced this supplementary treatment until, in the last two cases, little else was done.

(4) Surgical interference with the pregnancy should not be undertaken during the eclamptic attack, except for the most urgent obstetric indication.

My acknowledgment and thanks are due Dr. L. G. McNeile for the courtesy of being permitted to include cases from his service in this report; to my associates on the attending obstetric staff of the Los Angeles General Hospital for their cooperation in the work; to Drs. L. I. Kaffesieder and H. White, resident obstetricians, for their close supervision of the cases, and to my own associate, Dr. G. B. Greenbaum, for assistance in searching the literature.

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COMPARISON OF THE RESULTS OBTAINED AFTER RADICAL  
AND CONSERVATIVE TREATMENT OF ECLAMPSIA IN  
THE OBSTETRICAL DEPARTMENT OF THE  
JOHNS HOPKINS HOSPITAL

BY KARL M. WILSON, M.D., BALTIMORE, MD.

UNTIL the exact etiology of eclampsia is known, the treatment of patients suffering from it must necessarily be more or less empirical. The methods proposed for the treatment of this disease can be divided into one of two main groups: (1) Procedures in which immediately delivery of the woman is the object to be attained, and (2), those which aim rather at the control of the convulsions, delivery being a secondary consideration. In the latter group methods of treatment are encountered which would appear to be diametrically opposed; (compare for example the method of Stroganoff with the "Dublin" method), yet the advocates of each claim equally good results.

While in certain quarters the immediate termination of pregnancy, by radical surgical procedures if necessary, is still advocated; on the whole the tendency at present tends to follow more conservative lines.

Since the opening of the Obstetrical Clinic of the Johns Hopkins Hospital in 1894, to July, 1924, two hundred and forty-seven cases of eclampsia have been treated in the service, which may be readily divided into two groups, according to the lines of treatment followed. The first series includes those treated in the clinic from its opening until the year 1912, and comprises one hundred and ten cases. Of these sixty-one were of the antepartum, twenty-four of the intrapartum, and twenty-five of the postpartum varieties. In this series there were twenty-five maternal deaths, as follows: fifteen in the antepartum cases, six in the intrapartum cases and four deaths in the postpartum cases; a mortality of 24.6, 25 and 16 per cent respectively; while the gross maternal mortality for this series was 22.7 per cent.

In the treatment of the ante- and intrapartum cases in this series, the prime object in view was immediate delivery, following which other procedures such as sweating, purging, venesection, administration of sedatives, and administration of large amounts of fluid were made use of according to the condition of the patient. Immediate delivery, however, was the first consideration, the choice of procedure depending largely on the condition of the cervix. In the antepartum cases particularly, this involves the performance of numerous major obstetrical operations. In the earlier years, accouchement forcé with

instrumental and manual dilatation of the cervix followed by high forceps or version was the procedure usually employed. Later, the vaginal hysterotomy of Dührssen was employed extensively, and abdominal cesarean section to some extent. Some idea of the consistency of our procedure may be gained from the fact that only two of the 85 patients in this series presenting ante- and intrapartum eclampsia were delivered spontaneously.

Table I shows the division of the cases and the results obtained in the first series.

TABLE I  
FIRST SERIES

	NO. OF CASES	MATERNAL DEATHS	PER CENT	
Antepartum	61	15	24.6	} 21 deaths or 24.8 per cent
Intrapartum	24	6	25	
Postpartum	25	4	16	
Total	110	25	22.7	

The treatment followed in this series of cases was in general similar to that employed in most clinics at that period, and the end-results here, as well as elsewhere, left much to be desired.

In 1912 Lichtenstein reported a series of four hundred cases of eclampsia treated in Zweifel's Clinic, showing a gross maternal mortality of 18.5 per cent and in which the mortality of the antepartum, intrapartum and postpartum cases was 28.57 per cent, 12.6 per cent and 27.14 per cent respectively.

In the majority of the cases of ante- and intrapartum eclampsia, operative delivery of some type was carried out after a varying number of convulsions. On analyzing the results obtained, Lichtenstein found that in general the patients who did well were those who had lost considerable blood at the time of delivery, and he therefore argued that any benefit derived from operative delivery was in all probability dependent upon the loss of blood. Again, inasmuch as the mortality in the postpartum variety was 27.14 per cent, he very plausibly inquires why these results should be so poor if early delivery has any favorable effect on the prognosis, as in these cases one has the earliest possible delivery; that is before the outbreak of the attack. He was inclined to attribute such results as being due to the fact that the majority of the women had been delivered spontaneously and consequently had lost but a minimal amount of blood. Consequently, he concluded that equally good, or better, results should follow venesection without the addition of any serious operative procedure, and prompt improvement was noted in Zweifel's Clinic following the introduction of more conservative treatment.

Lichtenstein's arguments appeared so convincing, and our own re-

sults up to this time had been so unsatisfactory that it was decided to abandon the radical treatment of the ante- and intrapartum cases, and in future to rely upon more conservative procedures, more particularly free venesection.

Since 1912, one hundred and thirty-seven cases of eclampsia have been treated in the clinic along more conservative lines with a most pronounced improvement in the maternal results as shown in Table II. In other words, the gross maternal mortality has been reduced one-half.

TABLE II  
SECOND SERIES

	NO. OF CASES	MATERNAL DEATHS	PER CENT	
Antepartum	71	9	12.6	} 14 deaths or 12.8 per cent
Intrapartum	38	5	13.1	
Postpartum	28	5	17.8	
Total	137	19	13.8	

During this time numerous changes have been made in the treatment followed, particularly in the transition period following the change from active and radical to conservative treatment. Operative procedures aiming at delivery were not suddenly abandoned but have become less and less frequent, so that at the present time we feel that anything in the way of a major operation is seldom indicated except in the presence of actual dystocia.

Whereas in the first series only two of the eighty-five patients suffering from ante- or intrapartum eclampsia were delivered spontaneously, in the second series, spontaneous labor occurred in forty-seven cases or 43.1 per cent, while operative interference was limited almost entirely to low forceps or version and extraction after spontaneous dilatation of the cervix had occurred. Moreover, the types of operative procedure employed vary markedly in the two series, and while accouchement forcé, vaginal hysterotomy or cesarean section was employed in 79 per cent of the cases in the first series, only sixteen or 14.6 per cent of the patients in the second series were subjected to such procedures, and in the past seven years only two major operations were performed on eclamptic patients, one being a cesarean section on account of a generally contracted pelvis.

In the curative treatment of the patients in the second series, free venesection has been the most important feature. The amount of blood withdrawn has varied, according to the reaction of the patient. Most of the patients withstand the withdrawal of considerable quantities of blood without showing any alarming symptoms. While in general 500 to 700 c.c. of blood have been withdrawn, we have not hesitated to take as much as 1000 c.c. if the patient reacted well. On the other



hand, occasionally we have been obliged to discontinue the procedure after withdrawing as little as 200 to 300 c.c.

Morphia, either alone, according to the method advocated by McPherson, or morphia combined with venesection has also been made use of to a considerable extent.

As a result of our experience during the past twelve years we have become more and more conservative, and for the past two years patients suffering from ante- or intrapartum eclampsia have been subjected to the following regime:

1. They are placed in a quiet, darkened room and are disturbed as little as possible.

2. A hypodermic injection of  $\frac{1}{4}$  gr. of morphia is given at once. This may be repeated if indicated (particularly in the presence of undue restlessness or repeated convulsions) but not more than one-half grain is given in the first twenty-four hours.

3. The patient is kept turned on one side with the foot of the bed elevated as long as coma persists. Mucus is swabbed from the pharynx as it collects.

4. Venesection after the second convulsion performed under nitrous oxide anesthesia if necessary. One thousand c.c. of blood are withdrawn unless the systolic blood pressure falls below 100 mm. or the pulse rate shows alarming change during the process. (This is of course contraindicated in the presence of marked anemia.)

5. Water is given freely, as desired, when conscious. Those who cannot drink, on account of coma, are given 500 c.c. of 5 per cent glucose solution intravenously, which may be repeated in twelve hours.

6. A special nurse is in constant attendance until the patient is permanently out of coma.

7. No attempt is made at delivery until the cervix is fully dilated, unless some definite maternal indication apart from the eclamptic condition is present.

The treatment of postpartum eclampsia is identical with the above, except that the amount of blood withdrawn at venesection should represent the difference between the amount of blood lost at the time of labor and 1000 c.c.

At the British Congress of Obstetrics and Gynecology of 1922, Thomas Watts Eden suggested that the results of treatment varied greatly according to the severity of the disease and laid down the following criteria for differentiating between the mild and severe cases: (a) Persistent coma. (b) A pulse rate over 120. (c) A temperature above 103° F. (d) Convulsions numbering more than ten. (e) A urine which solidifies on boiling. (f) Absence of edema.

If any two or more of the above symptoms are present the case is

classified as severe; and as mild when none or only one of them is present.

Analysis of our two series of cases upon this basis shows a number of points of considerable interest, particularly from the standpoint of therapy.

In the following tabulations patients with chronic renal disease attended by uremic convulsions have been excluded as far as possible. Also, as the amount of albumin has been determined quantitatively in all our patients, I have chosen the figure of 10 grams per liter instead of (c) above.

Tables III, IV and V, show the results obtained in our mild and severe cases in each variety of eclampsia.

TABLE III  
ANTEPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	33	5	15.1	28	10	35.7
Second series	23	0	0	48	9	18.7

TABLE IV  
INTRAPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	16	2	12.5	8	4	50
Second series	19	1	5.2	19	4	21

TABLE V  
POSTPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	15	0	0	10	4	40.
Second series	16	0	0	12	5	41.6

Or if we tabulate the gross figures for the three types of eclampsia occurring in the second series:

TABLE VI  
SECOND SERIES

	NO. OF CASES	MATERNAL DEATHS	PER CENT	
Antepartum	71	9	12.6	{ 14 deaths or 12.8 per cent
Intrapartum	38	5	13.1	
Postpartum	28	5	17.8	
	137	19	13.8	

A perusal of these tables at once reveals the fact that a striking improvement has been brought about in the results obtained in ante-

or intrapartum eclampsia when the two series of cases are compared. I can say very little in regard to the postpartum variety, as the results in the two series are practically identical, and the line of treatment employed in the two series was similar. It would seem that where postpartum eclampsia is of a mild type, the end-results are in general satisfactory, whereas, if it be of the severe type it is an even more serious complication than the severe form of the disease occurring prior to delivery.

If we now compare more fully the end-results obtained in the ante- and intrapartum cases in the two series, we shall see how marked the improvement has been.

TABLE VII  
ANTE- AND INTRAPARTUM ECLAMPSIA

	MILD CASES	DEATHS	PER CENT	SEVERE CASES	DEATHS	PER CENT
First series	49	7	14.2	36	14	38.8
Second series	42	1	2.3	67	13	19.4

From the above figures it is seen that under conservative treatment maternal mortality in the mild cases has been reduced from 14.2 per cent to 2.3 per cent, while that of the severe cases has undergone a reduction of 50 per cent.

Notwithstanding this striking diminution in mortality, it should be noted that in the second series of cases five of the women died undelivered. Even when this is considered, the only conclusion that can be drawn from the results is that radical operative treatment not only does no good so far as influencing the disease is concerned, but actually does considerable harm. Further evidence in confirmation of this is afforded by considering the high mortality in the severe postpartum cases, and yet in them delivery had occurred before the onset of the eclamptic seizures.

Furthermore, the cases of so-called intercurrent eclampsia are also of interest in this respect. In twelve women in our second series of antepartum eclampsia, the disease yielded to conservative treatment, yet delivery did not occur until from one till twenty-two days after the cessation of convulsions. That such recovery prior to delivery does not necessarily depend upon the death of the child is evidenced by the fact that five of the twelve women gave birth to living children.

From the maternal standpoint then, our results indicate clearly that immediate delivery of the eclamptic woman by a radical operative procedure is unnecessary in the mild and inadvisable in the severe type of case, and that such treatment definitely increases the maternal mortality in both types of the disease.

The only remaining argument in favor of immediate delivery would be afforded by the fact that it leads to a marked improvement in the

fetal results. That, however, has not been our experience, and while conservative treatment does not improve the chances for the child, yet they are not materially diminished thereby. The fetal mortality will of course always be higher in the antepartum than in the intrapartum variety, as in many cases the child has not yet arrived at the period of viability.

TABLE VIII  
FETAL MORTALITY

	FIRST SERIES			SECOND SERIES		
	CASES	FETAL DEATHS	PER CENT	CASES	FETAL DEATHS	PER CENT
Antepartum	61	40	65.5	71	49	69.0
Intrapartum	24	9	37.5	38	15	39.4
Total	85	49	57.6	109	64	58.7

(The above figures for fetal mortality include all stillbirths and infants born alive but dying within the first two weeks, as well as the children of women who died undelivered.)

The severity of the disease distinctly influences the fetal mortality. In the two series combined, a gross fetal mortality of 77.6 per cent was noted in the severe antepartum as compared with 53.5 per cent in the mild cases; while the severe and mild intrapartum cases showed a gross fetal mortality of 51.4 per cent and 28.5 per cent respectively. As noted above, however, this was not appreciably affected one way or the other by the method of treatment.

From a study of these two series of cases treated along totally different lines we feel convinced that radical operative procedures should have no further place in the treatment of frank eclampsia, but that the last word in its treatment has not been spoken and obviously cannot be until the etiology of the disease is definitely established.

The treatment at present employed in the Johns Hopkins Hospital presents certain features of several well-known methods. It is to be regarded as purely tentative, and will be modified whenever increasing knowledge shall provide other therapeutic measures of greater promise.

In discussing end-results we agree with Eden that it is most important to distinguish between the mild and severe types of the disease; as the great majority of the former will recover with a minimal amount of treatment. For example, in our second series of cases there were nine patients who literally received nothing in the way of treatment, and yet were delivered spontaneously and made satisfactory recoveries. Had these patients been delivered by cesarean section, for example, barring surgical risks, the results would have been the same, and might well have been employed as a strong argument in favor of that procedure.

The end-results in the severe type of case still leave much to be desired, although those treated by conservative methods show a

marked improvement (50 per cent) over those treated by the radical method.

It might be well to discuss briefly a few of the procedures which have enjoyed a certain degree of popularity in the treatment of this disease, which as a result of our experience, we have either found useless or actually harmful.

Chloroform has been used extensively to control the convulsions. As a matter of practical fact it seldom can be administered in such a manner as to produce this effect, and its damaging effect on the liver is now well known.

The sweat bath also falls in the class of dangerous therapeutic agencies, and in the past a number of our patients so treated have shown alarming symptoms following its use. We feel that any advantages which might attend its use are more than offset by the dangers inherent to its use. Patients should be kept warm, but this can be done more satisfactorily with blankets and hot water bottles.

Particularly in the case of markedly edematous patients, large amounts of fluid should not be forced, as was formerly done, as the processes of elimination are unable to cope with the fluid already present.

Of operative procedures, I would particularly mention cesarean section. It is the physician who sees only a few cases of eclampsia who is particularly prone to employ it. Doubtless he may have perfectly satisfactory results in several successive cases, but in a large series of cases the end-results are poor.

Peterson reports a gross maternal mortality of 25.79 per cent, while in the series of cases reported at the British Congress of Obstetrics and Gynecology in 1922, there was a gross mortality of 23.8 per cent; or if only the severe cases are considered 43.2 per cent. These results are greatly inferior to those obtained under medical treatment. It is true that the fetal mortality is somewhat lower after abdominal section, but not enough so to justify the added risk to which the mother is subjected.

In our cases where cesarean section was employed, the fetal mortality was 40 per cent. Consequently, our feeling is that cesarean section in eclamptic women should be limited to those cases in which actual mechanical disproportion exists.

#### CONCLUSIONS

1. The end-results in the treatment of ante- and intrapartum eclampsia are twice as good under conservative as under radical treatment. Those cases do best which are subjected to a minimal amount of obstetric interference.

2. At the present time we feel that chief reliance is to be placed on free venesection combined with the use of morphia in moderate doses.

3. The performance of cesarean section as a routine procedure in the treatment of eclampsia is to be discouraged.

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JOHNS HOPKINS HOSPITAL.

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## FURTHER STUDIES OF RECURRENT TOXEMIA OF PREGNANCY\*

BY FOSTER S. KELLOGG, M.D., BOSTON, MASS.

ONE year ago, in a paper written for this society, I applied the term "recurrent toxemia of pregnancy" to cases in which in two or more pregnancies, symptoms of marked toxemia develop but in which it is impossible, between pregnancies, by all medical means at our disposal, to make a diagnosis of chronic nephritis or kidney insufficiency.

These conclusions were tentatively drawn:

1. That recurrent toxemia of pregnancy is a clinical entity distinct from pregnancy, complicating chronic nephritis and different from the single acute toxemia of pregnancy.

2. That whereas further investigation may show that this group consists of patients who have a faulty kidney balance, that is, a balance which allows them to live without kidney manifestations when not pregnant, but, when the load of pregnancy is added, develop kidney insufficiency, we are not in a position at present to say that this is true.

3. That this group of recurrent toxemia of pregnancy may be subdivided judging by results, into two classes—(a) that in which the prognosis under the strictest possible prenatal care is good for both mother and child, and (b) that in which the prognosis for the child is bad, no matter what prenatal care is carried out. This division is not sufficiently recognized even by those who feel that the above grouping is clinically correct, and it is on this point I would lay especial emphasis because it is of tremendous importance to certain individuals that in spite of previous failures to obtain a living child they can be taken through pregnancy and a living child secured.

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\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

It was further concluded that for a time we would study all private and Boston Lying-In Hospital "toxemic-chronic nephritic group" cases under a special index and by a routine study (the details of which were included in this preliminary paper) attempting to index each case under one of the three headings, i.e., acute toxemia, recurrent toxemia of pregnancy, pregnancy complicating chronic nephritis. It is on this year's study I wish to report.

Before proceeding to actual results of this work it seems wise to state briefly the observations and thoughts which led to the conclusions enumerated above.

1. From study of 400 "toxemic-chronic nephritic group" cases from the Boston Lying-In Hospital, records and forty odd private cases in the same group, I became convinced that (a) we often did not know whether we were treating an acute toxemia or a chronic nephritis, and that patients suffered from this ignorance; that (b) acute toxemia apparently occasionally repeated itself in another pregnancy; that (c) the condition *ablatio placentae* usually associated in our minds with toxemia or nephritis seemed occasionally to repeat itself in cases in which there was no interval evidence of nephritis; that (d) convulsions were not a necessary part of eclampsia; that (e) chronic nephritides in pregnancy more often have convulsions than we were accustomed to think.

2. From study of the literature and my own experience I became convinced that the likelihood of being able to differentiate between so-called "nephritic-toxemia" or kidney of pregnancy and so-called "preeclamptic toxemia" is so slight in the majority of cases as to be a useless distinction, and to more than agree with Kosmak when he says, "most cases are better labeled by the latter term." I came to feel all cases should be called "preeclamptic toxemia" or as we say "toxemia of pregnancy without convulsions."

3. We, my medical associate and myself, became convinced from observation that there was no profit in babies, and distinct loss of function and some loss of life in mothers, in attempting to carry true chronic nephritides through pregnancy, after one good trial. Thus we became keen to get such cases sorted out and on the records for sterilization in the event of repeated pregnancies.

4. One belief about which we argued was that this recurrent group were "concealed chronic nephritides," and that many of these patients, if they lived long enough, would ultimately disclose chronic nephritis. The follow-up work on acute toxemias with and without convulsions published by John W. Harris in a paper entitled "The After-Effects of the Late Toxemias of Pregnancy" (*Bulletin of the Johns Hopkins Hospital*, Baltimore, April, 1924, xxv, 398) shows that this is undoubtedly true in many instances although his results do not

exactly correspond with ours in this aspect so far as we have gone. His conclusions were:

"1. While no recurrences of eclampsia occurred in our series, the fact that three of the twenty-seven eclamptic patients who were seen one year later showed evidences of chronic nephritis, indicates that the danger of permanent renal damage following eclampsia is not to be disregarded.

"2. The danger of chronic nephritis following preeclamptic toxemia is unexpectedly great, as shown by the fact that 60 per cent of our patients whose pregnancies were complicated by preeclamptic toxemia showed evidences of chronic renal disease when examined one year later.

"3. We are unable to differentiate between the cases of preeclamptic toxemia which will be followed by chronic nephritis and those which will not result in permanent renal injury. It is possible that the duration of the symptoms of the toxemia before delivery may be an important factor.

"4. If, in supposed cases of preeclamptic toxemia, the evidences of the toxemia persist for three weeks or more after delivery, the presumption is that the underlying disease is renal in origin."

These conclusions are interesting but to our reasoning show, not that the risk of chronic nephritis is greater after toxemia without convulsions than after toxemia with convulsions, which seems illogical, but that many chronic nephritides first demonstrate themselves in pregnancy, and that the convulsion rate is higher in acute toxemia than in pregnancy complicating chronic nephritis. We are forced to argue, by what seems obvious logic, that the "three toxemias with convulsions" and the 60 per cent of "toxemias without convulsions," who had evidence of chronic nephritis one year later, represent, or at any rate include, a chronic nephritic group from the beginning, not resulting primarily from their toxemia, but from a latent kidney insufficiency; and that the twenty-four toxemias with convulsions, and the 40 per cent of toxemias without convulsions, who showed no evidence of renal disease one year later, represent, or at any rate include, an acute toxemia group; and that the figures three to twenty-four represent roughly the ratio of convulsions between the chronic nephritic group and the acute toxemic group. This figure about corresponds to our impression of what it has been in our experience. This study at all events does not mitigate against the integrity of the recurrent toxemia theory. first, because Harris' cases show elevated blood pressure and albuminuria between pregnancies, and second, because of our last observation, namely,

5. By autopsies (detailed in the preliminary paper) we proved (to our satisfaction at least) that recurrent toxemia of pregnancy exists



as a separate entity. Briefly, the most striking case was a woman who had from 1918 to 1923, four pregnancies marked by toxemic symptoms, and diagnosed and treated as chronic nephritis—although at two months in her third pregnancy her blood pressure was 120 and her urine negative. She died with a separated placenta and without convulsions in her fourth pregnancy, and at autopsy showed *acute* hemorrhagic and necrotizing hepatitis, and *acute* diffuse nephritis; in other words, the pathologic picture of toxemia of pregnancy and not of chronic nephritis.

Three autopsies seen lately this year bring out this distinction clearly. The first showed acute nephritis,—liver normal; the second, acute hepatitis and chronic nephritis; the third, acute hepatitis and acute nephritis, in a primipara.

Having now laid before you the observations and ideas that made a study under the three headings seem worth while, we can proceed to report the results of this study.

From the Boston Lying-In records we have a series of seventy-eight "toxemic-nephritic group" patients studied. From the private records we have forty-nine cases studied in seventy-four pregnancies. The material then totals 127 cases.

Under the suggested division of acute toxemias, recurrent toxemias, chronic nephritics, we have the following results.

## HOSPITAL SERIES

## 78 CASES

Acute toxemias	64	80%
Recurrent toxemias	7	9%
Chronic nephritics	4	5%
Acute toxemia and Chronic nephritic (autopsy)	1	5%
Doubtful	2	
	<hr/> 78	<hr/> 99%

## PRIVATE SERIES

## 49 CASES IN 74 PREGNANCIES

Acute toxemias	24	50%
Recurrent toxemias	10	20%
Chronic nephritics	8	15%
Doubtful	7	15%
	<hr/> 49	<hr/> 100%

The discrepancy in the two series so far as the relative frequency of acute toxemia and chronic nephritis, is obviously due to the fact, as shown by the previously quoted paper of John W. Harris, that the hospital series being only a little over a year old, and many of the cases primiparas, many of the cases thrown into the acute toxemia column for lack of interval study will ultimately go into the

chronic nephritic column. The private series dates back so much longer that it is without doubt more nearly accurate.

The same argument applies to the difference in the percentage of recurrent toxemias, 20 per cent in the private against 9 per cent in the hospital series. Both series are still too short to set a percentage figure for recurrent toxemia—probably somewhere between 10 per cent and 20 per cent will be correct. But the point I wish to emphasize at this time is this: of 127 "toxemic-nephritic group" cases studied from this angle, seventeen, about 14 per cent, apparently fall under the head of recurrent toxemia of pregnancy under its present strict definition.

From the hospital series we cannot demonstrate as yet the clinical value of this grouping beyond stating that we have laid the groundwork so that on the future appearance of these cases the visiting obstetrician will have at his command definite data from a previous pregnancy and interval study on which to base his decisions.

From the short private series we can indicate what results we may hope to obtain from indexing these cases as outlined, and on this diagnosis basing our decision for or against carrying on with a given pregnancy. (The special prenatal care for the recurrent group is detailed in the first paper.)

Analyzed, these ten recurrent toxemia cases give the following results:

CASE No. 79.—No babies after five pregnancies. We have never been able to control this patient and still feel that she might go to term if she did as ordered, since her most recent pregnancy went to nearly six months.

CASE No. 134.—Two live babies for which we can take no credit in this aspect—but we can advise against further pregnancies.

CASE No. 268.—Two live babies normally delivered at term, without signs of toxemia in the mother, after two accouchements forcés for "toxemia of pregnancy," and one six months miscarriage with toxemia, in good hands.

CASE No. 282.—First pregnancy, severe toxemia without convulsions; second pregnancy severe postpartum convulsions—both babies alive. We are able to advise this patient very definitely against future pregnancies. She was handled with great care both times, especially in her second pregnancy.

CASE No. 299.—No live babies in spite of three pregnancies—patient has a fibroid uterus.

CASE No. 371.—One live baby after two dead ones in other hands.

CASE No. 374.—One live baby after two miscarriages with elevated blood pressure and albuminuria.

CASE No. 388.—No live babies after two, or possibly three pregnancies. This patient has chronic gonorrhea, quiescent.

CASE No. 431.—One live baby after one six month's miscarriage with toxemia. Patient recently pregnant again and miscarried while on vacation.

CASE No. 434.—One live baby after one dead one, for which we can take no credit as she was followed by own physician.

Summing up then in these ten cases we have three in which there has been no result, one has gonorrhea, one has a fibroid uterus, one will not follow directions. In two others we cannot take credit for the babies. In the other five we have obtained three live babies after five dead ones, and two normally delivered babies in the mother's fourth and fifth pregnancy without toxemia, when in her first, second and third pregnancy she had toxemia coming on sooner each time, making necessary difficult operative deliveries in the first and second pregnancy and resulting in a dead baby at six months in the third.

We may credit this idea then with five babies and three mothers in the ten cases, and we believe we have not damaged the other mothers in giving them a chance, as we would had they been true chronic nephritics.

#### CONCLUSION

I believe that about 14 per cent of women showing toxemia symptoms in one pregnancy, often to the point of fetal loss or forcing delivery, not having chronic nephritis, will tend to show such symptoms in another pregnancy, and that in at least one-half of these, such symptoms and such results can be prevented by excessive prenatal care. The reason for this susceptibility to toxemia in this group we cannot say.

We believe such patients can be taken to the ordinary danger point of toxemia of pregnancy without the almost certain loss of the baby, and without progressive loss of function to the mother, as in chronic nephritics.

Hence we believe in determining as certainly as possible, and as early, in which group each patient belongs.

I wish to acknowledge my indebtedness to B. E. Hamilton of Boston, the internist with whom I have studied some of these cases, and to Judson A. Smith, lately resident Boston Lying-In Hospital, for material assistance in collection of both clinical and laboratory data.

The detailed histories of these seventeen recurrent toxemia of pregnancy cases may be found in the protocol, published in complete form in the Volume of Transactions of the Association for the current year, 1924.

19 BAY STATE ROAD.

(For discussion see page 265.)

## THE WASSERMANN TEST

### IX. THE DETECTION OF SYPHILIS IN PRENATAL CLINICS

BY DAVID L. BELDING, M.D., BOSTON, MASS.

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THE detection of syphilis in the prenatal clinic depends upon accurate Wassermann tests and careful clinical observations. The unreliability of the Wassermann reaction and the lack of clinical evidence renders the recognition of syphilis in the pregnant woman especially difficult. This paper considers the application of certain problems of laboratory and clinical technic to the routine detection of syphilis in prenatal clinics.

#### THE WASSERMANN TEST

The ideal Wassermann test for pregnant women should combine sensitiveness and specificity. Although no practical methods of eliminating many technical errors inherent in the present test are available, certain technical safeguards may minimize the factors which interfere with the efficient handling of blood from maternity patients. As long as fundamental principles are observed, minor differences of technic are of little consequence. The essentials are a high titre antisyphilitic amboceptor, titration of pooled complement, inactivation of sera, reliable antigens, suitable standard serum controls, a titration of at least two dilutions of serum, and ice-box fixation.

*Serum.*—In the blood serum of pregnant women the formation of anticomplementary and nonsyphilitic fixation substances is eight times as frequent as in nonpregnant women. The development of these substances which largely occurs after the withdrawal of the blood is augmented by unfavorable conditions of preservation, as regards time, sterility, and temperature. Blood should be taken not more than forty-eight hours before the test, in clean sterile tubes, preferably coated with paraffin. Especially with pregnant women, the use of unactivated serum tends to produce nonsyphilitic positives. After a few hours the serum is removed from the clot under sterile precautions and is inactivated immediately at 56° for ten minutes. It is placed in the ice box until the test when it is reactivated for ten minutes. The double inactivation tends to prevent the formation of anticomplementary and nonsyphilitic fixation substances.

*Antigens.*—Since there are no truly specific antigens for syphilis, care must be taken to use sensitive antigens which give a minimum of false positives. Plain alcoholic and acetone insoluble antigens, although they

agree closely with clinical findings of syphilis, particularly with water-bath fixation, frequently fail to detect latent syphilitics. As high as twenty-five per cent of the positives in pregnant women with cholesterolized antigens may prove nonsyphilitic, but if these more delicate antigens are not employed, an appreciable number of syphilitics will be overlooked. Preferably two antigens should be used, a cholesterolized and either a plain alcoholic or acetone insoluble. A composite antigen, such as Kolmer's, may possibly suffice for this double rôle, although I believe that it should replace only the cholesterolized antigen.

The antigenic dose, as tested against an appreciable number of untreated secondary and tertiary cases, should be at least  $\frac{1}{100}$  of the anti-complementary, and the amount used for the test should be at least  $\frac{1}{10}$  of the anticomplementary dose and ten times the antigenic dose. If the test dose approaches  $\frac{1}{2}$  the anticomplementary dose, nonsyphilitic fixation may result, since the serum of pregnant women has a tendency to become anticomplementary.

*Technic.*—For uniformity in various laboratories the Wassermann test should be performed in simple fractions of the original Wassermann volume and comparative results expressed in terms of the full volume. It is advisable to use the generally accepted antsheep system. The following procedure is one of several which are well adapted for testing the sera of pregnant women. Guinea-pig complement is titrated against a strong amboceptor of several units, in order to offset to some extent the natural antsheep hemolysin present in human blood. A preliminary water-bath fixation is performed with two cholesterolized alcoholic or Kolmer antigens, using the maximum amount of inactivated serum. All positive cases are subjected to ice-box fixation overnight (17 hours) with a plain alcoholic and a Kolmer antigen, a titration of 0.2, 0.1, 0.05, 0.025, and 0.0125 c.c. of serum in terms of the original Wassermann volume being used. Each tube of the titrated serum may be reported numerically, four-plus representing complete inhibition, i. e., 44420.

Results are considered dependable only when the control is *absolutely* clear. In this class of patients, even a slight inhibition in the control may render readings unreliable. The strength of the titrated serum may prove of differential diagnosis since a syphilitic fixation ordinarily is stronger than a nonsyphilitic. However, no arbitrary rule can be formulated as to the correct interpretation of the results with a cholesterolized antigen in differentiating true syphilis, and reports to the obstetrician should be made in terms of the cholesterolized and plain alcoholic or acetone insoluble antigens.

#### CLINICAL SYPHILIS

The prevailing type of syphilis in the pregnant woman at the prenatal clinic is hidden or latent. Few women voluntarily give a definite history of infection, few have any knowledge of primary or even secondary

lesions, and only a small number show any objective symptoms of the disease. In 5,000 maternity patients who were examined routinely without especial attention to syphilis, definitely clinical evidence was obtained only in 0.54 per cent and suspicious signs in 1.7 per cent, a total of 2.2 per cent, whereas the Wassermann test in the same group was positive in 9.2 per cent. For this reason, the examining physician must rely upon close observation and careful history taking, and must be able to weigh intelligently all suspicious or suggestive symptoms. If every patient is studied as a syphilitic suspect, it is surprising how many more syphilistics can be detected in the prenatal clinics.

*Clinical History.*—In history taking certain facts must be borne in mind regarding the prevalence of syphilis. Syphilis is twice as common in negroes as in whites. It is more prevalent in foreign nationalities, particularly from the south of Europe, Asia, and Africa. It is governed by social and economic conditions and is closely associated with intelligence. Residence, wealth, and occupation are appreciable factors regulating its distribution.

Syphilis is more prevalent in multiparae owing to longer opportunity for exposure from the husband. Multiparae furnish more information than primiparae, owing to the additional evidence of previous children and fetal deaths. Fetal deaths are only of confirmatory evidence, since but 7 per cent are the direct result of syphilis. However, multiple fetal deaths, which are more often due to syphilis, are of considerable value in connection with other suspicious signs.

The most fertile source of clinical information is the history of the mother, by which about one-half of the cases are detected. Women, either through ignorance or design are prone to overlook or to forget past symptoms which can only be brought out by careful questioning. Secondary symptoms are most readily remembered, whereas the primary lesion escapes notice. Previous treatment affords excellent evidence. Occasionally a history of syphilis in the husband is obtainable either through symptoms, treatment, or Wassermann test. The examining physician should follow a definite line of procedure in obtaining a history keeping in mind the general prevalence of the disease, its effect upon the family and the salient points of evidence in a syphilitic history.

*Physical Examination.*—Unless syphilis has been contracted during or just previous to pregnancy, the early lesions will not be found. Primiparae are more apt to show signs of early syphilis than multiparae. Evidence of old syphilis must be sought by the examiner, the most fruitful fields being nerve, eye, skin, bone, and cardiovascular irregularities. Unaccounted for paralyses, altered reflexes, pupillary irregularities, changes in fundi, deafness, stigmata of congenital syphilis, lesions of skin and mucous membrane, alopecia, scars, periostitis, and aortic disease are prominent among the pathologic signs of the disease.

## THE ROUTINE DETECTION OF SYPHILIS

The detection of every syphilitic entering a prenatal clinic is manifestly impossible. However, any appreciable reduction in the number of cases which ordinarily escape recognition is well worth while. The following tentative and somewhat ideal program will permit greater efficiency in the detection of syphilitics in the prenatal clinic. Its success will depend upon the co-operation of the social worker, the laboratory, and the clinical staff of the maternity hospital. Careful clinical examination and routine Wassermann tests should be made at the prenatal clinic. The cases are immediately passed as negative, selected for treatment, or referred for further investigation to the social worker and laboratory according to Procedure I.

## PROCEDURE I

WASSERMANN TEST	CLINICAL FINDINGS		
	POSITIVE	SUSPICIOUS	NEGATIVE
Positive	Treatment	Treatment	Refer
Suspicious	Treatment	Refer	Refer
Negative	Treatment	Refer	Pass

A positive interpretation is given to the laboratory report when both antigens are positive and a suspicious, when the plain alcoholic or acetone insoluble is negative and the cholesterolized is positive. The four border line groups in Procedure I are referred to the social worker for investigation of the family, and the Wassermann test is repeated. If the second Wassermann test corroborates the first, it is considered final unless a spinal fluid examination is indicated. If different, further tests are required until uniform results are obtained. With the social worker's report and a second Wassermann test, a further elimination is made according to Procedure II.

## PROCEDURE II

WASSERMANN TEST	CLINICAL REPORT OF SOCIAL WORKER AND PHYSICIAN		
	POSITIVE	SUSPICIOUS	NEGATIVE
Positive	Treatment	Treatment	Suspicious
Suspicious	Treatment	Suspicious	Suspicious
Negative	Treatment	Pass	Pass

The final disposal of the suspicious case depends upon the sum total of evidence in the individual patient. Obviously the judgment and opinions of obstetricians will vary. The following scheme is suggested by the writer:—

If the titrated sera of the suspicious cases in Procedure II are strongly positive with the cholesterolized antigen, the patient is treated. If a weak positive, no treatment is given. With each of the untreated suspicious patients the same procedure is followed as with those who

receive antenatal treatment. The placenta is examined for pathologic evidence of syphilis, the infant is carefully watched and subjected to an x-ray examination, and blood for a Wassermann test is taken at the age of two weeks and at subsequent intervals. The reason for not giving presumptive treatment to the prospective mother, particularly when the Wassermann is positive, is due to the occasional unreliability of the reaction in pregnant women and the probability that the child of an old latent syphilitic with a weak reaction would prove healthy without treatment. If sufficient evidence is obtained from the microscopical study of the placenta and x-ray examination, treatment of the child can then be instituted.

#### SUMMARY

A tentative plan for facilitating the detection of syphilis in prenatal clinics is outlined. Its success depends upon the proper co-ordination of laboratory and clinical examinations, and recognition of the limitations of each as applied to maternity patients.

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## TWO CASES OF MYELOID LEUCEMIA COMPLICATED WITH PREGNANCY: TREATED WITH TOPICAL APPLICATIONS OF RADIUM

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PREGNANCY complicated by leucemia is unusual but leucemia complicated by pregnancy is a distinctly uncommon condition. In 1888, Cameron<sup>1</sup> reported five cases of pregnancy developing leucemia, including one of his own, but found no case of leucemia becoming pregnant. Sänger,<sup>2</sup> in 1888, reported two cases from the literature and one of his own, which developed leucemia between the second and third months of pregnancy, going on to delivery of a healthy child. He stated that the blood from the umbilical cord was normal. Sänger agreed with Cameron that some of these so-called "leucocythemias" present in older literature were probably septicemias. Askanazy<sup>3</sup> confirmed Sänger's statement that the blood corpuscles of leucemic mothers did not penetrate through the placenta to the child, and that the child could remain healthy. Peterson,<sup>4</sup> reporting a case in 1914, quotes Baum as never having seen a case of leucemia and pregnancy in twenty years' experience, consisting of 22,000 deliveries. Wallgren,<sup>5</sup> in 1920, felt that there were only three sure cases of acute leucemia in pregnancy in addition to his own. Kosmak,<sup>6</sup> in 1920, found no case before 1888 and



twenty since then. He briefly reports twelve cases, with two of his own. Hansam,<sup>7</sup> in 1922, finds ten cases in the literature and adds another case. Brief protocols of the cases we have been able to find in the literature together with the two cases we are reporting bring the total up to seventeen.

CASE 1.—(Cameron 1888). Aged thirty-six, para vii. Two previous children had leucemia. Tumor developed in left hypochondrium during sixth pregnancy; under treatment for one year for leucemia. Delivered of living male child at end of seventh month. Child died four days later. Autopsy negative for leucemia. Again became pregnant with exacerbation of symptoms. There was early relief of symptoms following delivery, which was accompanied by scant hemorrhage. Child died after fifth month. Again became pregnant resulting in dead fetus. (Lymphatic type.)

CASE 2.—(Sänger, 1888). Leucemia discovered in second to third month of pregnancy. Child born healthy. Blood from cord normal.

CASE 3.—(Greene<sup>8</sup>, 1888). Aged twenty-one, para 0. (One sister had died of leucemia.) Conceived June 13; November 25, losing strength. Anemic. Proportion of whites to red 1-20. Forceps delivery December 8, after spontaneous labor. Scant amount of blood lost. Died ten hours after delivery.

CASE 4.—(Laubenburg, quoted by Kosmak, 1891). Aged thirty-two, para ix, three miscarriages, six children, living and well. Gradual decline during past six or seven years. Worse during pregnancy. Improved after labor. First noticed a swelling in left side at fifth month. (Macerated fetus.) Death forty hours after delivery. Autopsy confirmed diagnosis of splenomyelogenous leucemia.

CASE 5.—(Hilbert, Askanazy, 1893). Aged thirty-seven, para viii—developed fever in eighth month. Five weeks later leucemic blood picture. Macerated fetus. Very slight bleeding with delivery. Sudden collapse and death ten hours postpartum. Autopsy confirmed diagnosis.

CASE 6.—(Schroeder, reported by Kosmak, 1888). Aged twenty-five, para v. Always sickly. Two miscarriages. Splenic enlargement after fifth labor. Labor induced resulting in recently dead fetus. Autopsy on child negative. No marked change for better after delivery. (Splenic leucemia.)

CASE 7.—(Melinkow and Zomakion, quoted by Kosmak, 1913). 220,000 leucocytes. X-ray treatment over long period of time. Placental section showed complete separation of the maternal (leucemic) and fetal (normal) blood.

CASE 8.—(Peterson, 1914). Aged twenty-four, primipara. Anemic for seven years. Blood count showed no leucemia although liver and spleen were enlarged. Healthy, vigorous child born prematurely, showing no abnormality. No hemorrhage at delivery. Sudden collapse of mother one and one-half hours after delivery. Autopsy showed in liver, spleen and bone marrow, myeloid leucemic condition.

CASE 9.—(Kosmak, 1920). Para iii; 472,000 leucocytes; 88 per cent small lymphocytes. No autopsy was obtained.

CASE 10.—(Kosmak, 1920). Aged thirty-five, para iv; 106,000 leucocytes; 85 per cent large lymphocytes. Mother died two weeks after delivery.

CASE 11.—(Lindbrones, quoted by Wallgren, 1920). Aged twenty-five, para iii; positive oxidase reaction. Death. Fetus 3.5 cm. long.

CASE 12.—(Meurer<sup>9</sup>, 1921). Spontaneous delivery of twins in healthy condition. (Myeloid leucemia.)

CASE 13.—(Hansam, 1923). Aged thirty-eight. One healthy child. 1917, 620,000 leucocytes. Six x-ray treatments. Three and half months later spleen small; leucocytes 71,300. In 1920 became pregnant second time. Small hemorrhage at delivery. Child two weeks premature; somewhat underdeveloped although blood was normal.

CASE 14.—Renon and DeGraiss,<sup>10</sup> 1920, report a case of myeloid leucemia which, after eight applications of radium became pregnant, resulting in the delivery of a normal child, which was five and one-half years old when the case was reported.

CASE 15.—Renon and DeGraiss, 1920, report another case of leucemia under radium therapy, becoming pregnant, which, however, was interrupted at five and one-half months.

#### AUTHORS' CASES

CASE 1.—Mrs. L. B., aged 24; family history negative; had malarial fever in summer of 1920. Menstrual history negative—last period July 15, 1922. In September had a slight show for one day. Chief complaints: pressure pains in left hypochondriac regions, swollen abdomen and weakness. In May, 1920, developed pain in upper left abdomen, not severe enough to confine her to bed; at times, however, interfering with sleep. This was associated with swelling of the ankles. In June, 1920, she was admitted to the Royal Infirmary, Manchester, England, for five weeks. Following this, she had ten x-ray treatments of fifteen minutes duration over the splenic area. No improvement followed and she again returned to the hospital and remained there for seven weeks, having fourteen additional treatments of the same duration. She then had x-ray treatments at weekly intervals for entire year, fifty-two in all. The swelling increased rapidly in size after the x-ray treatments were discontinued. The enlargement has always been tender. There has been no history of epistaxis or other bleeding from the mucous membrane. Since July, 1922, she has perspired excessively and the pain has increased; during the three months prior to admission to the Samaritan Hospital, asthenia was profound and she complained of nausea and precordial distress. Admitted to hospital, October 29, 1922.

*Physical Examination:* Height about five feet four inches, weight 120 pounds; fairly well nourished. Skin warm and moist—color good. Slight dyspnea. Pupils equal and react to light and accommodation—convergence normal; sclera show slight yellowish tinge. Tongue moist, slightly coated, tremulous. Teeth poor, gingivitis and receding gums. Pharynx injected. Tonsils small. Glands: no adenopathy. Neck: some enlargement of vessels with marked pulsation.

Lungs showed increased fremitus over right apex; decreased over right base; no râles. Left border of heart one-half inch inside the left anterior axillary line. Right border one-half inch to the right of the right sternal line. Heart sounds good. Systolic murmur at pulmonic area. Both sounds heard in vessels of neck and murmur heard at suprasternal notch. No thrill. Pulmonic accentuated. Vessels soft. Pulse of equal volume on both sides, of water-hammer type.

Abdomen, extremely distended and tense. Circumference at umbilicus 84.4 cm. and at costal margin 79.6 cm. Spleen filled entire left side of abdomen, to left iliac crest and extended diagonally from a point just to the right of the ensiform cartilage to within about 7 cm. of the anterior superior spine of the right ilium and thence downward to the symphysis. (See Figs. 1 and 2.) Liver extends from fourth interspace 2.5 cm. below the costal margin. Extremities: Reflexes diminished, otherwise negative.

Blood count on admission, hemoglobin 50 per cent (Sahli). Red cells 3,168,000. White blood cells 398,000. Polys 40 per cent; small lymphocytes 1.5 per cent; mononuclears 0.5 per cent; eosinophiles 5 per cent; basophiles 1 per cent; myelocytes



Fig. 1.—Case 1: October 30, 1922, before application of radium.



Fig. 2.—Case 1: October 30, 1922, before application of radium.

neutrophilic 40 per cent; eosinophilic 3 per cent; basophilic 5 per cent. Nucleated reds were present both normoblasts and intermediates. A slight degree of basophilia and anisocytosis were present. (Coagulation time on three different occasions was eight minutes by Boggs-Brodie method.)



Fig. 3.—Case 1: November 29, 1922, after one application of radium.



Fig. 4.—Case 1: January 9, 1923, after two applications of radium

Urinalysis on admission: acid, 1024; faint trace of albumin—no sugar. Microscopic—few epithelial cells, pus cells and mucous shreds; occasional red cells. Phenolsulphonephthalein kidney functional test, 50 per cent first hour, 25 per cent second hour and 20 per cent third hour

Our technique of radium application was as follows: the border of the spleen was outlined in ink and subdivided in 5 cm. squares. One hundred mg. of radium

enclosed in a brass capsule 1 mm. in thickness was placed 2 cm. distant from the skin and allowed to remain over each blocked area two to four hours, until a total of about 4800 mghr. had been given. The first application of 4800 mghr. was begun October 31, 1922 (Fig. 3). The second treatment of 5400 mghr. began November 29 (Fig. 4). The third and fourth treatments of 4800 mghr. were given January 9, 1923, and February 27. The effect of these applications can be seen



Fig. 5.—Case 1: Liver—weight, 7.17 kilos.



Fig. 6.—Case 1: Spleen—note uniform enlargement and maintenance of shape after removal. Weight, 2.25 kilos.

in Table I. The last application, 2400 mghr. on June 28, showed no effect on the blood picture.

The patient entered the hospital for delivery June 26, 1923, complaining of pressure pains at lower border of the left ribs, posteriorly. On June 28, 100 mg. of radium were applied over five areas for a total of 2400 mghr. This was followed by a slight increase in temperature with an increase in the size and tenderness of

the liver. The spleen diminished somewhat in size but the leucocytes increased in number slightly. The patient went into actual labor July 19 at 7 P. M. and was delivered of a living male child at 9:30 P. M. July 21. During the third stage there was no hemorrhage or laceration. At 5 A. M., July 22, patient vomited a large quantity of liquid and died 6:30 A. M., nine hours after the delivery.

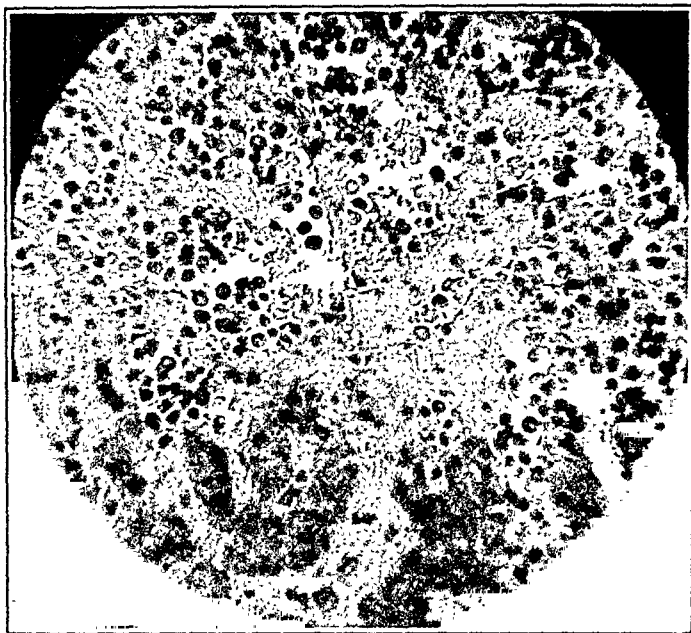


Fig. 7.—Case 1: Liver (high power). Note atrophy of liver cells and presence of myelocytes and myeloblasts in sinusoids.

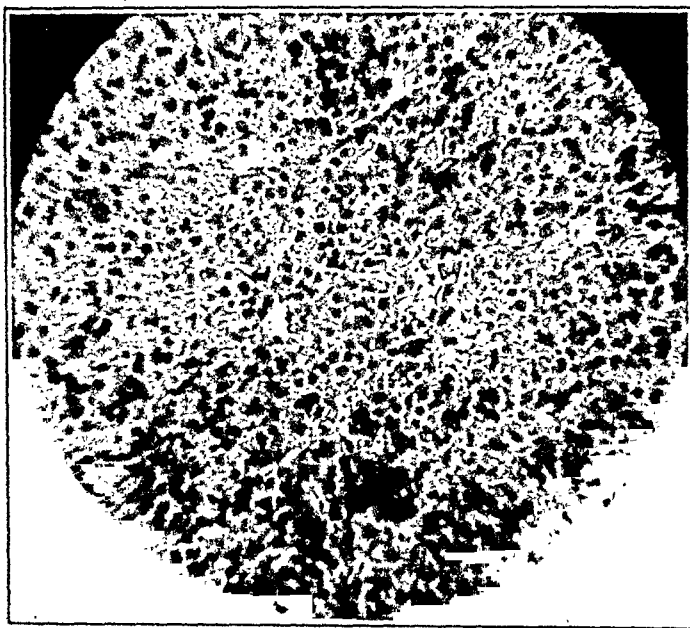


Fig. 8.—Case 1: Spleen (high power). Note absence of marked fibrosis and indistinct outline of sinuses, due to myelocytic infiltration.

The salient points in autopsy were as follows:

Heart: about 200 c.c. of clear pale greenish fluid in pericardial cavity. Normal size—pale and somewhat flabby. Lungs edematous. Liver: lower border on a level with the umbilicus in the mid-line and reached to the crest of the ilium on the

right. Uniformly enlarged. Quite soft in consistency and pale in color. Lobulations indistinct (Fig. 5).

**Spleen:** Extended almost to crest of ilium on the left. No adhesions. Notch well marked. Greatly enlarged, 35 x 22 x 10 cm., weigh 2.25 kg. Firm in consistency. Capsule gray and showed a few small whitish patches slightly raised above surface. It cut with great resistance and showed firm red splenic pulp and thickened trabeculae. Malpighian corpuseles not visible. Small accessory spleen at hilum. (Fig. 6.) **Kidneys:** slightly larger than normal, soft in consistency and pale in color. Cortex normal in width. Striations regular. Malpighian bodies visible in places. **Ovaries:** small, 1 x 2 x 0.5 cm., and firm in consistency. Surface roughened. No adhesions. Uterus enlarged, soft and boggy. No glandular enlargement.

**Microscopic Examination:** Liver—capsule thin. Lobulations indistinct, due to fatty degeneration of many liver cells, atrophy of some and destruction of a few and filling of the sinusoids with rather large, deeply staining mononuclear, granular and nongranular cells (myelocytes and myeloblasts) (Fig. 7). Spleen: Capsule

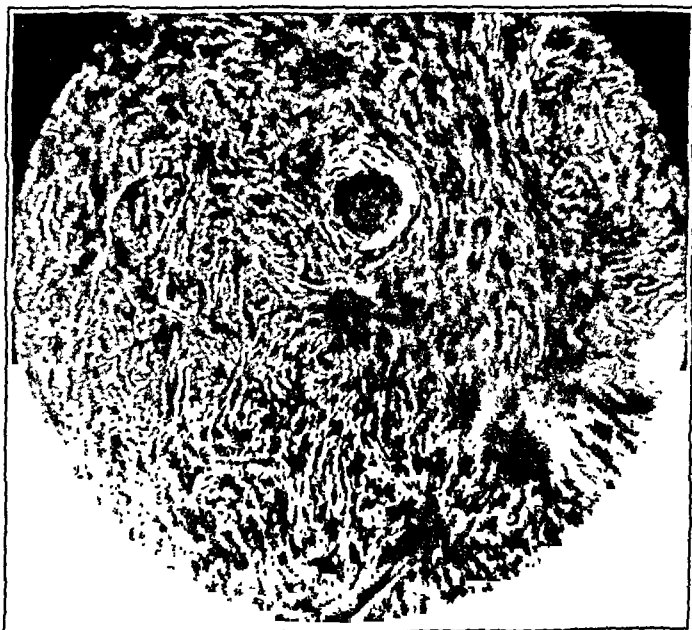


Fig. 9.—Case 1: Ovary (high power). Note slight increase of fibrosis, absence of cellular infiltration and normal immature graafian follicle (shrinkage due to fixation).

and trabeculae thickened. Splenic reticulum slightly fibrosed and sinusoids filled with myelocytes and myeloblasts. Malpighian corpuseles decidedly atrophic and hard to identify because of myelocytic infiltration. (Fig. 8.) **Kidneys:** capsule thin. Bowman's capsule and glomerular tuft appeared normal. No area of abnormal cell infiltration. Epithelium of tubules swollen, granular and desquamating in places. **Ovary:** Peritoneal coat somewhat thickened. Stroma seems to show slight increase in fibrous tissue. Blood vessels were somewhat thickened. Numerous corpora albicantia were present and many primordial and immature graafian follicles, in all respects normal (Fig. 9). One graafian follicle was present in the section examined, about one-half developed, showing a small round-cell infiltration at one edge. No other areas of cellular infiltration were observed.

**CASE 2.**—C. F., aged 25. Family and personal history negative. Patient first menstruated when twelve years of age. This occurred but once, and was of three days' duration, moderate in amount and painless. Between the ages of twelve and seventeen at the time of the monthly period she suffered from epistaxis. This

usually lasted from five to ten minutes. When she reached the age of seventeen she menstruated every twenty-eight days, four to five days' duration, of moderate amount and painless. Her period on August 7, 1923 was normal. She was married September 5, 1923. September 7, she began to menstruate; the flow was very profuse and was accompanied by lower abdominal pain, colicky in nature, which confined her to bed. There was no nausea or vomiting. Flow ceased September 12 and she felt well enough to be about. September 14, however, flow returned, rather scant in amount, painless, and lasted until September 23. Since then there has been no bleeding or leucorrhea. Felt movement about February first. From February second to twenty-third, she complained of backache; no nausea or vomiting. Breasts increased in size. About November 15, 1923, she developed pain in the epigastrium and left hypochondriac regions, not severe enough to interfere with sleep. It was worse during the day, not influenced by the taking of food nor associated with

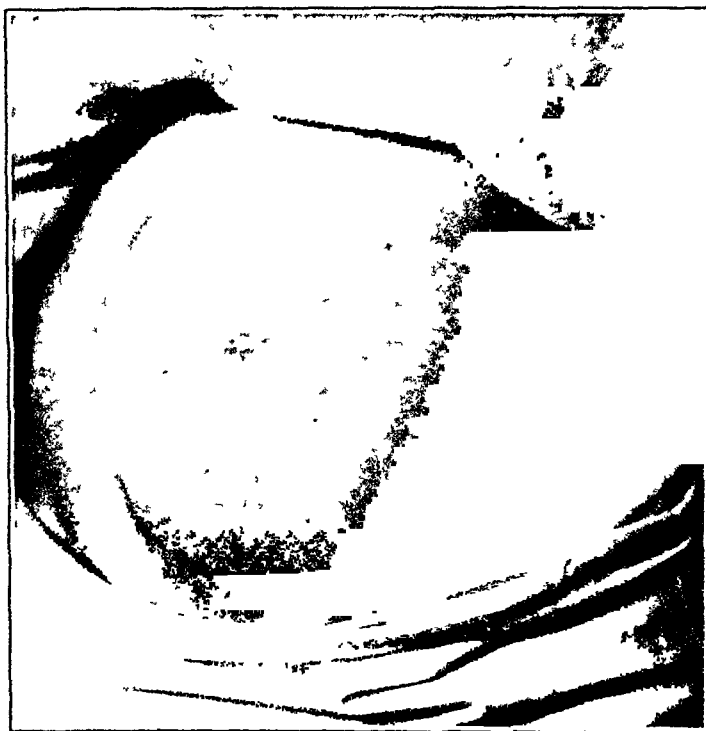


Fig. 10.—Case 2: On December 24, 1923.

nausea or vomiting. About this time she became rather weak. She was not constipated and did not complain of vertigo, cephalalgia, fever or sweats. She did not notice that her abdomen was larger than normal until her attention was directed to it by her family physician.

*Physical examination, December 24, 1923.* Height five feet four inches, weight 118 pounds. Pupils react to light and accommodation. Slight degree of exophthalmos, (bilateral). Teeth in good condition. Thyroid normal size. No adenopathy. Lungs negative. Heart sounds normal. Abdomen appeared to be enlarged to about the size of a seven months' pregnancy. Mass filled about two-thirds of the entire abdomen, extending from midpigastrium obliquely downward to within 5 cm. of the anterior superior spine of the right ilium; the lower border extending from here to a point 7 cm. above the anterior superior spine of the left ilium (Fig. 10). Liver enlarged about 3 cm. below right costal margin. Uterus about the size of a two and one-half months' pregnancy. No other abnormality noted. No free fluid in the abdomen.



Extremities normal. No varicosities. Reflexes, superficial and deep, present—no Babinski. Urinalysis negative.

Blood count on admission December 29, 1923, Hb. 60 per cent (Sahli); R.B.C. 3,460,000; W.B.C. 248,000; polys 54.7 per cent; eosin. 2.8 per cent; baso. 0.7 per cent; small lymphs. 0.7 per cent; large lymphs. 0.3 per cent; neut. myelo. 33.3 per cent; eosin. myelo. 3.6 per cent; baso. myelo. 3.8 per cent. Wassermann negative.

Patient entered hospital December 29, 1923. Splenic area was blocked into squares, 5 x 5 cm. Over this was placed 100 mg. of radium, screened by 1 mm. of brass 2 cm. distant from skin. This was changed every four hours. A total of 5400 mghr. was given. Patient was discharged from hospital, December 31. The change in the blood picture may be seen in Table II.

Patient reported to the hospital weekly for blood counts. On April 26, count

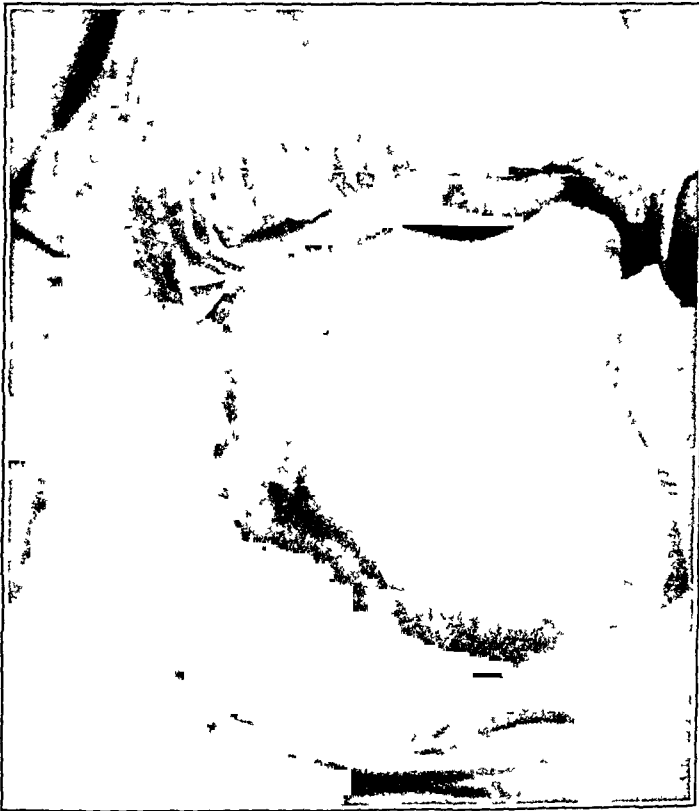


Fig. 11—Case 2: March 28, 1924, thirteen weeks after one application of radium. Pregnant uterus outlined below.

showed an increase to 74,000 leucocytes per cm. At this time arrangements were made for admission to the hospital for further radium treatment, on May 3, 1924. She was readmitted May 1, 1924, complaining of severe headache and with symptoms of broncho-pneumonia, respiratory embarrassment and cardiac failure, blood count showed R.B.C. 4,432,000; W.B.C. 242,400; polys 33 per cent; eosin. 5 per cent; baso. 1 per cent; small lymphs. 3 per cent; large lymphs. 3 per cent; mononuclears 1 per cent; neutrophilic myelocytes 30 per cent; eosin. myelo. 3 per cent; baso. myelo. 3 per cent; myeloblasts 18 per cent. Radium treatment was deferred until the patient should show improvement in her pulmonary condition. She died May 3, 1923. It is possible that much of the respiratory embarrassment was due to an overcrowding of the capillaries in the alveolar walls with white cells and that radium treatment might have ameliorated this condition. Permission could not be obtained for an autopsy which might have confirmed this supposition.





## DISCUSSION

In discussing one of the rarest forms of the primary anemias, according to Cabot<sup>11</sup> five times as rare as pernicious anemia, one seems justified in referring briefly to the present day conceptions of the etiology, touching briefly the pathology and symptomatology and contrasting the various treatments advised.

*Etiology.*—Practically nothing definite is known as to the cause; according to E. H. Funk,<sup>12</sup> Sternberg considers that acute myeloid leucemia is not a definite disease and that the symptoms are due to a septic infection, especially by streptococci and that acute lymphatic leucemia is due to a general infection. Funk also quotes Berlinger<sup>13</sup> who reports six cases, four of which were regarded as acute. No bacteria were found in the blood or in the organs in any case, nor did the postmortem changes correspond with those of sepsis in any of the cases. Arvid Wallgren<sup>5</sup> reports four cases of pregnancy complicated by acute leucemia and notes the marked contrast in the results of the examination of the blood of the mother and that obtained from the placenta; in the former a typical leucemia picture, in the latter, normal blood. One child remained in good health and histologic examination of sections from the spleen, liver and bone marrow of the other three failed to reveal any evidence of leucemia, which he felt argued against any infectious origin.

According to MacFarland<sup>14</sup> there seems to be hereditary predisposition to the affection. He mentions the case of a woman reported by Emerson, whose grandmother, mother and one brother were leucemic, and who had borne two children who died of the disease; she also had three healthy children.

Young<sup>15</sup> presents the results of a further study into the etiology of leucemia and an account of lymphoma and lymphosarcoma experimentally produced in the mouse. He studied three cases of leucemia and obtained from the blood of each, an organism similar to that previously isolated from human carcinoma. Subsequent to the death of one of the patients a growth in pure culture was obtained from the liver. This culture, when injected into mice, produced lesions similar to those found in mice infected with the mouse strain. The organism was isolated, not only in lymphatic leucemia but also in the myelogenous variety; a fact that argues in favor of the common etiology of these diseases.

Ewing<sup>16</sup> states "that while it is impossible to prove that leucemia is always caused by a single infectious agent or that it represents anything more than a clinical entity comparable to leucocytosis, these various lesions belonging to essentially the same condition illustrate every gradation from an acute inflammatory process up to a chronic and somewhat malignant neoplasm."

Inasmuch as the cause of the disease is not known, it should be classed with the malignant neoplasm, at least for the present. Anders<sup>17</sup> states that "it is likely that the direct cause of the leucoeythemia is a simple increase of the cytogenic function of one or more of the hematopoietic organs."

Mallory<sup>18</sup> says that "the myeloblastoma is a fairly common and very important tumor which has been generally recognized as such only within recent years. The usual form under which it appears is as myelogenous leukemia. \* \* \* If the cells of the tumor are proliferating slowly, many of them have the opportunity to differentiate into fully developed leucocytes. \* \* \* When the tumor is growing rapidly the cell differentiation may be slight."

*Symptomatology.*—The symptomatology differs in the acute and chronic forms. In the acute forms, hemorrhage, prostration and fever are more marked and the splenic tumor develops quickly. In the chronic form, however, at least 50 per cent consult the physician for a mass in the abdomen—this may or may not be associated with pain. According to Osler,<sup>19</sup> about one-third become aware of their illness by loss of weight and strength. In this type of case, the disease has existed for months before the patient consults a physician. Hemorrhage is not a prominent symptom and was not present in the two cases reported.

Digestive disturbances, constipation, or at times an obstinate diarrhea are frequent complaints. Exophthalmos and priapism are less frequently noticed, although both of our cases presented a moderate degree of bilateral exophthalmos. Fever of a moderate degree is usually present at some time during the course of the disease, and dyspnea, due in the early stages to a leucocytic overcrowding of the pulmonary capillaries and later to a pleural effusion, is not an uncommon symptom.

*Treatment, Intravenous Medication.*—Little or no benefit has followed intravenous injection of arsenic preparations. Lowenburg<sup>20</sup> reports a case of lymphatic leucemia in a boy nine years of age who showed a marked reduction of cellular elements following the intravenous injection of 0.3 gm. of neosalvarsan. Lowenburg is of the opinion that the hemolytic action of the arsenic was responsible for a drop in hemoglobin from 65 to 19 per cent; erythrocytes from 2,330,000 to 1,410,000 and leucocytes from 29,600 to 2,400.

Quaba and Ohashi<sup>21</sup> report a case of acute lymphatic leucemia in a boy of five years and nine months old in which 0.15 and 0.1 gm. of neosalvarsan were given intramuscularly eleven and eighteen days apart. There was a marked reduction of white cells, from 84,610 to 19,040, but this was accompanied by a reduction of hemoglobin and erythrocytes and the patient died at the end of five months.

Meurer<sup>9</sup> gave 50 mg. of tartar emetic intravenously eight times ap-

parently with good results in a case of myeloid leucemia associated with pregnancy, the mother giving birth spontaneously to twins who lived and showed no evidence of the disease.

Renon and DeGraiss<sup>10</sup> used in addition to the topical applications of radium, intravenous injections of radium and mesothorium sulphate in doses of 20 mg. every two days for fifteen days. They also gave 25 drops of benzol daily for short periods of time.

*Benzol in the Treatment of Leucemia.*—Funk<sup>12</sup> quotes Vaquez Yacoel as reporting a case of myeloid leucemia treated by benzol in which the cure lasted eight years, but states that benzol is being used less and less each year.

Toxic effects following the administration of the drug are frequently reported; gastrointestinal disturbances, headache, dizziness, kidney irritation and hemorrhage. Marked leucopenia with increasing anemia and death may occur. Boardman<sup>22</sup> calls attention to the deaths reported by Meumann and Stein following the administration of the drug. In Meumann's case the white cells dropped to 200 per c.mm.; the patient developed severe nose bleed and died thirty-nine days after discontinuing the drug.

Autopsy showed aplastic bone marrow and central necrosis of the liver. In Stein's case, the white cells decreased in 16 days from 73,000 to 8,000. At this point benzol was discontinued but the destruction of the leucocytes progressed, reaching 460 per c.mm. Epistaxis developed and the patient died twenty-two days after discontinuing the drug. Salol coated capsules containing 0.5 gm. of benzol, with equal parts of olive oil to diminish the irritating effect, are given. Two of such capsules are given at first, increasing until ten (5 gm.) a day are administered. They should be taken immediately after meals, and never during meals, and according to Boardman, it is important that the patient be kept in the hospital during the treatment. It may take ten days to three weeks before the effect upon the blood is observed. It is customary to stop administration when the white count has reached 20,000.

Boardman states that 16 out of 100 cases failed to show improvement and that another eight cases, although reacting favorably at first, died during or soon after the discontinuance of the treatment.

*Operative Treatment.*—The majority of our textbooks of surgery advise against splenectomy in the treatment of leucemia. Duane and Greenough<sup>23</sup> do not mention splenectomy. They state, however, that topical applications of radium give temporary relief. Warbasse<sup>24</sup> states that "Leucemia is no longer treated by splenectomy as the operation is found not to give relief." DaCosta<sup>25</sup> is of the opinion that splenectomy should not be performed in leucemia. Ashurst<sup>26</sup> says, "Splenectomy is contraindicated in most cases of leucemia; it may be necessary in some early cases." Giffin<sup>27</sup> reports twenty-five patients splenectom-

ized after preliminary treatment with radium. Seven persons lived more than three years after operation. Giffin<sup>28</sup> also states that "they (the Mayos) have done splenectomy in not more than one case in every twenty-five or thirty cases that we have seen"; that "occasionally we have removed spleens of the hard fibrous type in very chronic types of the disease," and that "in the great majority of cases of myelogenous leucemia, splenectomy is of questionable value."

*X-Ray Treatment of Leucemia.*—In a review of the literature on the x-ray treatment of myelogenous leucemia, one is confronted with variations in technic and management, depending to a great extent upon the individual operator. One of the most important points to be determined is the question of treating the bone marrow. Stengel and Pancoast<sup>29</sup> stated that "applications should be made systematically to the bones of the entire body with the exception of the head," and "that direct exposure of the spleen and other secondary enlargements should be carefully avoided during the earlier part of the treatment." They were convinced that the "bone marrow is the primary seat of the morbid process no matter whether the disease is of the so-called myelogenous type or of the lymphatic variety."

During the past twelve years, however, operators have been treating the bone marrow less frequently until at the present time few advocate the procedure. One of the most recent operators, G. E. Richards<sup>30</sup> advises against this procedure as do Ordway<sup>31</sup> and Boardman. There is also a tendency to use the smaller doses of roentgen ray; thus Richards, in describing the results obtained in the treatment of twenty-two cases, states that "our results would lead us to the conclusion that better results are to be obtained by a technic designed to depress the function of the cells which are in a condition of hyperplasia than by one designed for the destruction of the cells. The use of terrific radiation with high spark gap and heavy filtration will result in extreme fibrosis of the spleen, and other changes of a permanent and disadvantageous nature in the medulla of the bones, and will not give as good ultimate results as a less severe procedure." Radiation is commenced on the spleen, using areas four inches square and limiting the treatment to one area each day. This technic eliminates nausea and brings the patient gradually under the influence of the rays. He emphasizes the importance of maintaining the spleen at its minimum size, that once having been made to disappear, it should remain so, as the chance of its responding to radiation after a secondary enlargement is very slight. The same conditions hold for radium according to Renon and DeGrais.<sup>32</sup> Many observers report better results in the treatment of leucemia with benzol and x-ray than with x-ray alone. Among these are Lafleur<sup>33</sup> and Edwin Schisler and E. E. Brown.<sup>34</sup> The report of the latter includes a complete study of the effect of the roentgen ray and benzol on the normal and abnormal

blood content. Benzol and x-ray had no ill effect on the hemoglobin or red blood cells. X-ray seemed to destroy polymorphonuclear leucocytes or to slow up their production, but had relatively no such effect upon the red cells or their production. The x-rays in every trial produced a decrease in the absolute number of small lymphocytes but had no constant effect on the relative count. Myelocytes were not so affected; relatively they were decreased by the x-ray, while the absolute number showed no constant change. Benzol, on the other hand, caused a steady fall in the absolute but did not affect the relative myelocyte count. Polymorphonuclears were destroyed constantly and rapidly by each dose of the x-rays. The absolute count was affected more markedly than the relative. Benzol gave a slighter absolute decrease of polymorphonuclears than the x-rays and a more constant and rapid increase relatively. Basophilic myelocytes disappeared readily under benzol only to reappear temporarily after each dose of x-rays. As the blood picture approached normal limits, the basophilic myelocytes were reduced under benzol, reappearing when benzol was discontinued and were again present following the administration of x-ray; on resumption of benzol they again disappeared. The x-rays had less effect on reducing the myelocytes than the lymphocytes and leucocytes.

*Treatment of Leucemia by the Gamma-Rays of Radium.*—The acute types of leucemia, whether of the myelocytic or lymphatic variety are refractory to treatment. Ordway<sup>35</sup> states that radium is of no value in the acute splenomyelogenous leucemias, and a thorough search of the literature fails to reveal cases that have been successfully treated by any method. In the chronic types of leucemia, radium is the treatment of choice. The literature abounds in reports of cases treated successfully by the gamma-rays that have been refractory to other forms of treatment. Simpson<sup>36</sup> quotes Renon, DeGraiss and Desbouis, who obtained remission by application of radium in a patient previously unsuccessfully splenectomized, the white count dropping from 143,000 to 21,500. They accounted for the effect by the exposure to the rays of a large volume of blood circulating in the abdomen. Ordway<sup>31</sup> has obtained remissions with radium in cases of leucemia that were completely resistant to the x-rays. Case 1 in our report received x-ray treatment over a period of eighteen months with only temporary improvement, but responded to the first application of the gamma-rays of radium. Peabody,<sup>37</sup> Henriques and Merville,<sup>38</sup> Bowing<sup>39</sup> and others have reported series of cases that have been successfully treated by topical applications of radium. As yet, however, it must be regarded as palliative only and not curative. It may be that the intravenous injections of thorium as advocated by Falta, Kriser and Zehner<sup>40</sup> will produce more favorable results.

*Technic of Radium Treatment.*—In cases observed by us, the border of the spleen was outlined in ink, and subdivided into 5 cm. squares;



radium in brass capsules 1 mm. in thickness was placed 2 cm. from the skin. Each area received from two to four hundred milligram hours. The number of total milligram hours varied from 2,400 to 5,400. Blood examination was made every two weeks (at times more frequently) and treatment was not repeated if hemoglobin and red cells showed an increase and the white cells a decrease in number and no application was made with a leucocyte count lower than 20,000.

There is a diversity of opinion regarding the duration of application of the radium. Henrique and Merville<sup>38</sup> advise a maximum of 2,200 to 2,400 mghr. spread over four areas, near the center of the spleen and repeated monthly, claiming that the gamma-rays affect the spleen itself aside from the action on the blood as it enters the spleen; also that by "moderate doses applied monthly we do not only diminish the white count but also exercise a certain regulatory action upon the splenic function and through it, upon the hematopoietic system in general." Ordway<sup>31</sup> states that radium applied to the spleen is a marked stimulus to red-cell formation. Witcher<sup>41</sup> also advises moderate doses 1,400 mghr. repeated twice monthly.

On the other hand, Peabody<sup>37</sup> states that "recent results have seemed to indicate that the administration of one or several large treatments followed by an intermission of at least several weeks, until all evidence of radium action has ceased, is more satisfactory than the use of smaller doses at more frequent intervals." DeGrais<sup>42</sup> advises intensive treatment 4,400 to 4,800 mghr. He reasons that subsequent applications are not as effective as the first owing to the production of fibrosis in the spleen.

Most writers agree that the bone marrow should not be subjected to the action of the gamma-rays, Soiland,<sup>43</sup> Simpson<sup>38</sup> and Witcher,<sup>41</sup> the latter calling special attention to the danger of treating bone marrow at the same time, since its power to produce red cells may be weakened so that the red cells and hemoglobin decrease along with the leucocytes. In this regard one must keep in mind the indirect effect of the gamma-rays on portions of the hematopoietic system other than that radiated; also the marked sensibility of the lymphocyte to radiation (Leo Loeb<sup>44</sup>). Small doses of either x- or gamma-rays produce a temporary decrease in the number of lymphocytes, but if the larger ones are given, the initial drop is followed by still greater destruction. We have observed, not only in leucemias but in other malignant processes, that an increase in the absolute number of lymphocytes has been associated with improvement and vice versa.

According to Murphy and Wakahara<sup>45</sup> the increase in the number of lymphocytes is due to an increased multiplication of cells in the germ centers of spleen and lymph nodes and they believe that the latter are responsible for the increased number in the circulating blood. They feel that this stimulation is not the result of a direct action of

the rays but due to a substance which appears in the blood following radiation, which, when mixed with lymphatic tissue *in vivo* exerts a stimulating effect upon the latter. This we have also observed clinically in a case of pseudoleucemia, axillary nodes disappearing almost miraculously after radiation of the hypertrophied cervical glands. In any instance the treatment of leucemia by radiation is not the simple problem it apparently seems to be. If this is true of uncomplicated myelocytic leucemia, we have still a greater problem when the disease is associated with pregnancy.

In reviewing the literature we have been struck by the tremendously high maternal mortality in cases of myeloid leucemia that have been permitted to go to term or near term. Death occurred almost invariably from one and one-half to forty hours following delivery. No apparent immediate reason was set forth as the cause of death. In our own case which occurred during the tenth hour following delivery, postmortem revealed the usual changes plus pericardial effusion of moderate degree.

*Effect of Radiation on the Blood.*—Within a week following the application of radium there is a diminution in the total number of leucocytes. This is most marked in the immature type of cells, both myelocytes and myeloblasts, with a relative increase in the polymorphonuclears and lymphocytes. The permanence of this diminution varies directly with the dosage. Coincident with a fall in leucocytes there is usually an increase in red cells and hemoglobin. In Case 1 the leucocyte count just before death reached 90,880 and showed no apparent effect from radiation over the spleen the latter part of June. This last radium treatment was followed by a rather marked reaction; the liver increasing in size and becoming quite tense and tender, possibly due to the addition of a cellular destruction from the spleen, on the already overworked liver. At no time was there absence of myelocytes in the peripheral blood, although the percentage fell quite markedly from the original figure of 40 per cent to less than 10 per cent under radium therapy.

In Case 2, following one application of 5,400 mghr., the leucocytes steadily fell to 9,550 per cu., thirteen weeks later. Beyond an initial nausea, following this large dosage no untoward effects were noticed.

In any patient under radium treatment, whether for malignancy, leucemia or any other disease, we have made frequent blood counts routinely and have attempted by this means to keep the dosage of radium less than that which will produce a marked diminution in the normal absolute number of lymphocytes, approximately 2,000 per cubic mm., having noted that a great destruction of lymphocytes was not associated with improvement and vice versa. In Case 1, the lowest lymphocyte count of just above 1,000 was noted one week after 5,400 mghr. In Case 2, the lowest figure of slightly below 1,000 per cubic

cm. was encountered thirteen weeks after the initial treatment, but the following week had reached 1,500.

In Case 1 it is a little difficult to fix the date at which conception occurred. When examined on June 19, 1923, the size of the uterus corresponded to that of a six months' pregnancy. The age of the child on delivery, July 21, 1923, was estimated at six and one-half months, and was normal in all respects from outward appearance and blood count. To correspond to the size of the child at delivery, conception probably occurred some time during January, which would mean that the patient had already had three radium applications, a total of 15,000 mghr. One might be permitted to assume that this rather large amount would be sufficient to produce a decided effect on the germinal cells of the ovary, for it is an established fact that the immature cells of both ovary (ovum) and testis (spermatozoa) are most susceptible to radium rays and yet both ovaries at postmortem showed distinct and apparently normal primordial follicles (Fig. 9).

Matthews,<sup>46</sup> in experimental work on the ovaries of laboratory animals, found no change after 80 mghr. of radiation. Above 1,200 mghr. there was some round-cell infiltration and some fibrosis of the blood vessels and stroma, with a few imperfect or no graafian or primordial follicles. The same findings were encountered in the human ovaries studied. Young and healthy ovaries stood more radiation than older, less active ones.

The apparent resistance and immunity of the ovary in our case must be due to the fact that it was pushed far down into the pelvic cavity by the increased intraabdominal pressure of the enlarged spleen and was thus protected to some extent from the full effect of the rays. Although early in the treatment, when the spleen extended to the pubis, and was radiated in this area, some of the rays must surely have penetrated quite deeply into the pelvis, although their actual intensity was probably diminished by the intervening spleen and short local application (3 to 4 hrs.).

Quite recently there has been some trepidation in current literature regarding the effect of radiation of the pelvic organs on pregnancy and the development of the child. Bagg,<sup>47</sup> experimenting with white mice, found that radiation of the generative organs resulted in maldevelopment of the offspring. The effect of radiation was not apparent in our case from histologic study of the ovary, nor was the child abnormal in any respect. Renon and DeGraiss report normal, perfectly formed children in their cases, one living and well five and one-half years later. Hansam's case, although small, being two weeks premature, was normal. In this connection it might be interesting to note the case Keene<sup>48</sup> reported, with an external carcinoma of the cervix, first seen during the fifth or sixth month of pregnancy. The patient received 4,000 mghr. radium treatment, was delivered in the

eighth month and both mother and child were well eight years later.

Pregnancy occurring in cases of myelogenous leucemia is uncommon enough as a search through the literature has shown, but it is extremely rare in cases under radium treatment.

Of the seventeen cases reported, two others beside our own became pregnant while under radium treatment, Cases 14 and 15 and two others following x-ray treatment, Cases 7 and 13. In Case 14, the original blood count was 240,000 W.B.C., the spleen was 22 cm. in length, extending from xiphoid to pubis and 13 cm. to the right of the midline. Treatment consisted of intravenous injections of radium and mesothorium sulphate and benzol by mouth in combination with topical applications of 189 mg. of radium bromide (101 mg. of pure radium) filtered through 2 mm. of lead and 1 cm. of gauze. This quantity of radium was so arranged that each square cm. of surface was covered by 2.4 mg. of radium and one treatment consisted of 4.848 mgr. After eight such treatments, the patient became pregnant, was delivered and finally died three years and one month after the first treatment, having had sixteen topical applications in all. In the second case of Renon and DeGraiss (Case 15), pregnancy was terminated at five and one-half months for the good of the patient, which seems to be the accepted therapeutic procedure. In this case, the child, although dead, was in all respects normal.

The child in our case weighed, ten days after birth, two pounds ten ounces. Physical examination showed a small child with no glandular enlargement or marked enlargement of the liver or spleen. Differential smear from the placental end of the cord at birth showed a normal fetal blood picture of occasional myelocytes and many nucleated red cells (normoblasts). Blood count from baby July 31, 1923, ten days after delivery, was as follows: Hemoglobin 90 per cent (Sahli); red blood cells 4,800,000; white blood cells 12,000; polymorphonuclears 65 per cent; small lymphocytes 32 per cent; large lymphocytes 3 per cent; transitional 2 per cent. The child did not thrive on artificial feeding, gradually lost weight and died August 11, 1923. Autopsy was denied.

#### CONCLUSIONS

From a review of the literature and our own personal observations in these two cases of leucemia and pregnancy and other leucemias, we feel that heavy initial doses of radium are to be preferred to repeated smaller doses; and that of equal, if not greater importance, is the early emptying of the uterus in cases complicated by pregnancy.

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2008 WALNUT STREET.

## REPORT OF 224 CASES OF IMPETIGO IN THE NEWBORN\*

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THE purpose of this paper is to call attention to the condition known as contagious impetigo of the newborn and to show the various ways in which it is manifested. There is confusion in the literature because the terminology of the different types has been interchangeable and loosely applied. The most serious form of the disease is that in which the vesicles coalesce rapidly and then rupture, leaving large areas of exfoliation. This condition is known as exfoliative dermatitis. Pemphigus is the term applied to those cases in which there are large blebs and this form is rarely seen although the name is that popularly applied to all forms. A third type and the one most often found is that in which there is a formation of small vesicles that may coalesce but do not result in large areas of exfoliation and this condition is known as impetigo. In the epidemic about to be described we have had experience only with the so-called vesicular and exfoliative forms.

\*Presented, by invitation, at a meeting of the New York Obstetrical Society, November 11, 1924.

†One hundred and seventy-nine cases occurred on the second division. The remaining cases occurred on the third division when the epidemic was ending and are included in the report through the courtesy of Dr. Rice.

*History.*—As early as 1864 Tilbury Fox<sup>1</sup> described contagious impetigo occurring in infants and children. He particularly drew attention to the vesicular form and little can be added to his description of the clinical manifestations of the disease. Numerous reports followed but it remained for Matzenauer<sup>2</sup> in 1900 to link together pemphigus neonatorum and impetigo contagiosa and to show that the causative agent was the *Staphylococcus aureus*. Sabourard<sup>3</sup> in the same year declared that the disease was a mixed infection due to streptococcus and staphylococcus, the latter being the secondary factor. In 1917 F. H. Falls<sup>4</sup> studied a number of cases of the disease in the Chicago Lying-In and Cook County Hospitals and isolated on culture the staphylococcus which was often grouped in short chains or appeared to be a diplococcus. He proved that this organism was the causative factor and to fulfill Koch's postulates he inoculated his own arm and obtained a distinct vesicle at the end of twenty hours. At the end of forty-eight hours the culture yielded the organism injected. Morphologically the characteristics of this organism have led to the assumption that the streptococcus and the staphylococcus were involved together. The diplococcic form was first seen by Demme<sup>5</sup> in 1886 but he did not connect this diplococcus with the staphylococcus; and Almquist<sup>6</sup> in 1891 stated that in the serum of the vesicles there were diplococci that proved to be *Staphylococcus aureus* when grown on culture media.

The disease also occurs in older children but we shall confine ourselves to the neonatal period of life. A number of epidemics have been reported in the last twenty years but it is universally accepted by obstetricians that the disease occurs sporadically in large maternity hospitals. Schwartz in 1908<sup>7</sup> at the New York Lying-In Hospital reported 27 cases with seven deaths. Cole and Ruhl<sup>8</sup> in 1914 reported nine cases with one death. Biddle<sup>9</sup> in Detroit had a 30 per cent mortality in an epidemic that took place in the Woman's Hospital in 1911 and in 1914 at the same hospital a group of seventeen cases consisting of twelve babies, three nurses, two mothers with no deaths. Knowles<sup>10</sup> of Philadelphia reported a 33 per cent mortality in an epidemic of thirty cases. Falls reported from the Cook County Hospital forty-seven cases with two deaths and he states that the disease spread to several mothers and one nurse and that it was necessary to close the wards for a month. These reports make it evident that the disease is contagious not only to the babies but to those caring for them. Theoretically the transmission of the disease is by contact or inoculation but its contagiousness is similar to that of other infectious diseases of childhood. Falls cites an illustration of this fact: none of the women who were in the Cook County Hospital and were transferred to the Monroe Street Hospital showed evidences of the disease at the time of transfer or at any other time, yet nine children over two years of age with whom they came in contact in their new residence contracted the disease while the babies not in contact with the women remained free.

#### OUTBREAK AT BELLEVUE HOSPITAL

In the five years preceding 1922, sporadic cases appeared in the ward. The first case in the epidemic was seen March 8, 1922, in a baby eight days old. The following day the second case was reported in a baby five days old. Both of these children had a diffuse bright reddening and edema of the skin of the back that spread, gradually involving an area approximately 7 cm. in diameter over the scapulae. There were no circumscribed vesicles. The epidermis became loosened from the corium and there was a vesicular bulging of the former. The superficial skin appeared opaque and soon ruptured leaving the

livid corium exposed. At first it was thought, because of the peculiar location in both babies, that these might be burns due to hot water bags but as the bags were not used in the cribs after the day of birth it was apparent that heat was not the cause. The rapid spreading of the lesions and the angry appearance of the skin led us to suppose that erysipelas had developed in the burn. After consultation with the erysipelas service the babies were transferred to the contagious ward where they died some time later of malnutrition and at a time when the skin lesions showed a tendency toward healing. In the light of further developments it became evident that these cases were exfoliative dermatitis and exactly like the condition described by Ritter and called by him "dermatitis erysipelotosa." The third case developed four days after the first in a baby seven days old who had a small pustule on the neck which spread rapidly so that in a few days the neck was encircled with coalescing vesicles which later exfoliated. As it was about time for the mother to be discharged she insisted upon taking the child home. Two days later she reported at the clinic with the baby showing much larger areas of exfoliation. She refused hospital care and it died at home that night.

From this time on until November, cases developed but no other deaths occurred in the entire group. Practically all the cases appeared from the fifth to the eighth day of life. In the early stages, most of the cases showed coalescence of the vesicular area and the exfoliation spread chiefly under the arms and about the neck. Only one case had any vesicles or exfoliation on the trunk or legs, but a few had exfoliation on the arm and about the hand. There were several intervals of eight or ten days when no fresh cases appeared. As the epidemic progressed, the coalescence of the vesicles became infrequent except over small areas, their distribution was more discrete and their size only about one-half a centimeter in diameter. Finally, at the end of the epidemic, the blebs were but few in number and discrete. After the first three cases, the infants who were infected had no temperature, lost no weight, took their feedings in a normal manner and showed no evidences of irritation. Several premature babies were affected and progressed favorably in spite of the disease.

The individual lesion appears first as a small reddened area which develops a vesicular top within a few hours. At the end of forty-eight hours or less, the top of the vesicle containing turbid fluid shrinks over its summit and may then subside without rupture, or else it ruptures and the fluid runs out leaving exposed a moist red plaque surrounded by shreds of epidermis, the remains of the vesicle wall. On the other hand the lesion may spread quite superficially, losing its character as a vesicle with the result that an area of corium some 2 cm. in diameter may be covered with a wrinkled edematous surface. We noticed

early that the vesicles appeared to be autoinoculable and our treatment was directed toward maintaining the integrity of the vesicle wall.

*Bacteriology.*—Cultures were made from the blebs of a considerable number of the babies and for the most part *Staphylococcus pyogenes aureus* was found; occasionally, however, there were present what appeared to be streptococci and diplococci. Just previous to the epidemic there were several mild infections in the wards. On February 17, one infant had an infected finger; a few days later another child had a furuncle of the scalp and on February 28, eight days before the outbreak of the epidemic, there was another infected finger. These cases were not segregated and it occurred to us afterwards that these infections might have been the starting point of the epidemic. The anatomic structure of the skin of the infant is well adapted to the development of vesicular lesions and all infants showing paronychia or any other form of purulent inflammation should be segregated at once.

*Attempts at Control.*—Realizing the inoculability and infectiousness of the discharges from the vesicles, immediate steps were taken to isolate the patients. All babies with the disease were segregated in a room in another wing of the building and a group of nurses was assigned to care for these babies. As far as possible admissions were restricted to our regular clinic cases. It was difficult to determine whether or not overcrowding had anything to do with the continuation of the epidemic. The fifth month after the epidemic started and at a time when the disease was not so virulent, only a few vesicles appeared on any baby, and 135 mothers were delivered with an incidence of 64 per cent in the babies. In other words during the summer months the crowding and the heat seemed to lead to an increase in the number of cases. For a period of six months (February to August) there were 608 deliveries, 306 of which were males and 302 females, with 175 cases of the disease—89 of which were males and 86 females or a total incidence of 28.7 per cent. A comparison was made of the cases delivered by the different members of the staff to determine whether the infections were due to faulty technic on the part of any one man or to the possible fact that one individual was a carrier of the organism. It was found that the incidence was in the neighborhood of 25 per cent except for one man who had a 35 per cent incidence. This increased percentage might easily have been due to the fact that there were a larger number of infected babies in the ward at the time when his total of the deliveries was taken.

INTENSE	NO. OF CASES	% OF INFECTIONS
1	119	35
2	130	24
3	144	23
4	157	25



The record of the day and night shifts of the nursing staff was examined and it was found that there were approximately as many infections in the day cases as in the night.

	NO. OF CASES	NO. OF BLEBS	PERCENTAGE
Day	342	85	24.8
Night	314	90	28.6

It was the custom for the operator who delivered the baby to oil it and it was thought that possibly this maneuver carried on without change of gloves might be the source of the infection, especially as the skin around the neck and axilla where the creases are so often filled with vernix caseosa were the areas most frequently involved. Therefore the procedure was stopped and the babies were afterwards oiled by the nurses, a proceeding that made no change in the prevalence of the disease.

As a result of these observations we came to the conclusion that the infections did not occur in the delivery room. We made three changes in the location of the neonatal ward. The method of procedure was as follows: the new cases were received only in the new ward and the old nursery was gradually vacated by discharge of the babies already located there. A new set of nurses took on the duty of the newly opened ward. Following the closing of the room it was washed down with soap and water and cresol solution. These changes had no effect; new cases sprang up in the new ward as soon as the babies were five or six days old. Each infant as it showed evidences of infection was segregated in a separate room at some distance from the nursery and it was not taken into the common nursery at any time thereafter, although it was taken into the ward for the nursing period.

*Transfer to Adults.*—There were only two cases of transfer to adults. A nurse developed a bleb on her finger but it did not spread and healed in the course of ten days. One mother had a lesion on the breast just outside the pigmented area and she also developed one, later, on the buttock not far from the anus; both lesions healed in the course of a week.

*Treatment of the Individual Child.*—The principal factor in the treatment was protection from autoinoculation by preventing, so far as possible, the rupture of the vesicles and by bandaging areas involved so that the child's fingers would not come in contact with them. In the first month the lesions were painted with 50 per cent iodine and in a number of cases the blebs were punctured and the base painted with iodine. In a later group the blebs were painted with 3 per cent silver nitrate solution, and in still another 50 per cent calomel ointment was used. The ointment method was harmful as the vesicles spread beneath the film. Still later, the blebs were merely dusted with

aristol and bandaged and, finally, in the last fifty to seventy-five cases when the blebs had become discrete they were merely oiled with liquid albolene and a dressing applied.

#### DISCUSSION

This disease, of which we feel that we have had a larger series than has occurred in any other maternity hospital, is remarkable for the absence of mortality. No baby died of the disease in the ward, and the two infants that died in the contagious pavilion lived ten days to two weeks and their skin lesions were healing at the time of death. The third baby was practically untreated due to the lack of cooperation of the mother. The most interesting observation was that the illness was self-limiting with a tendency toward spontaneous recovery. Even when there was considerable exfoliation around the neck and axilla, the general health apparently was not affected and there was a normal return to the birth weight. We recovered the staphylococcus from many of the blebs and in those cases in which there appeared to be streptococcus and staphylococcus, we now believe there were short chains of staphylococcus or arrangements of the organism as a diplococcus. It is evident to us that the exfoliative dermatitis was nothing more or less than an extension of the vesicular type with exfoliation following, and therefore that exfoliative dermatitis and contagious impetigo in the newborn are the same disease; and we wish again to call attention to the conclusion of Matzenauer that pemphigus—a condition that we did not see in our group—and exfoliative dermatitis are the same. Therefore it seems probable that the three conditions are one and that the changing form depends upon the amount of exudation and the spreading of the blebs.

#### CONCLUSIONS

1. It is apparent that contagious impetigo and exfoliative dermatitis of the newborn are the same disease and are due to the *Staphylococcus aureus*.

2. This infectious disease is also contagious and has a self-limiting course with a tendency toward spontaneous recovery and the general health of the infant is but little affected.

3. It is probable that the best method of treatment is to paint the affected areas with sterile liquid albolene and to place aseptic dressings in order to prevent the rupture of the vesicles with the consequent autoinoculation.

4. The mortality in the 224 cases was 1.3 per cent and it is probable that death occurs only in those cases with considerable exfoliation and secondary infections.

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130 EAST FIFTY-SIXTH STREET.

(For discussion see page 266.)

## SOME OBSERVATIONS ON DYSMENORRHEA AT GOUCHER COLLEGE

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IN the *Journal of Industrial Hygiene* for June, 1923, Margaret Sturgis reported results of observations on dysmenorrhea occurring in women employed in a large department store. Her work at that time covered the record of some 2,077 women. She tabulated the degree of incapacity experienced by these women in industry. Four classes of dysmenorrhea or menstrual normal history were studied as follows, with symbols 0, 1, 1.2, and 2, used to designate the various classes.

0. Those who experience no discomfort. Those who feel a slightly lowered efficiency but who do their work without complaint.

1. Those who begin work and later are compelled to seek relief from a hot drink, medication or rest on a couch or bed with hot water-bottle.

1.2 Those who occasionally remain at home or go home during first day of period, but at other periods suffer little or moderate pain or discomfort.

2. Those who are compelled to remain at home one or more days of each menstrual period.

Among the various conclusions reached by Sturgis in her study on dysmenorrhea in these 2,077 women in industry, the following facts stood out:

65 per cent had no menstrual handicap.

30.6 per cent had slight menstrual handicap.

4.4 per cent had serious menstrual handicap.

As the medical records of Goucher students on entrance to college have been kept rather accurately for a number of years with reference to dysmenorrhea that incapacitates for work, it seemed worth while to make some study of these records according to the group classification of Sturgis. Three groups from early, middle and later periods in the history of the college were selected for comparison:

1. Students entering college 1900-1907 .....	533
2. Students entering college 1917-1923 .....	1516
3. Students in college 1923-1924 .....	1023
<hr/>	
Total number .....	3072

Chart 1 gives the numbers in each class according to the classification of Sturgis.

CHART I.

CLASSES BY YEARS	NUMBER OF STUDENTS	CLASS 0	CLASS 1	CLASS 1.2	CLASS 2
1900-1907	533	334	107	54	38
1917-1923	1516	1122	149	213	52
1923-1924	1023	882	128	9	4

Summary of Chart 1 by percentages is as follows:

Classes 1900-1907

No menstrual handicap .....	62.6 per cent
Slight menstrual handicap .....	30.3 per cent
Serious menstrual handicap .....	7.1 per cent

Classes 1917-1923

No menstrual handicap .....	74 per cent
Slight menstrual handicap .....	23 per cent
Serious menstrual handicap .....	3 per cent

Students in college during the year 1923-1924 whose records were based on time lost from work because of dysmenorrhea:

No menstrual handicap .....	86.6 per cent
Slight menstrual handicap .....	13.1 per cent
Serious menstrual handicap .....	.3 per cent

We find in these records a progressive advance towards menstrual normalcy. This advance is usually accounted for by freer clothing and more athletic life of women. We are inclined to believe at Goucher that a more sensible attitude in the mothers and a better mental attitude in the daughters is largely responsible for the gain.

The absences recorded from class work at Goucher for dysmenorrhea include those of Baltimore city girls under care of their own physicians and of resident students.

In the year 1923-1924, 142 students were absent 194 times. Analysis of time lost in these absences shows:

Loss of 2 days .....	6 times
Loss of 1 day .....	47 times
Loss of 1 hour to $\frac{1}{2}$ day .....	141 times

Total ..... 194 absences

Largest number of absences in one student .....	4
Number of students with 4 absences .....	3
Number of students with 3 absences .....	10
Number of students with 1 or 2 absences .....	129

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Total number of students absent ..... 142

Study was also made of the possible effects of college life on menstruation, comparing the records from 1920 to 1924, of presence or absence of dysmenorrhea on entrance with presence or absence of dysmenorrhea in college.

The following charts compare entrance records with dysmenorrhea in college.

CHART II.

GOUCHER STUDENTS 1920-1924	NUMBER OF STUDENTS	ENTRANCE RECORD, "DYSMENORRHEA ALWAYS"	NO ABSENCE IN COLLEGE	NOT MORE THAN ONE ABSENCE	TWO OR MORE ABSENCES
Senior	183	8	2	2	4
Junior	206	7	0	2	5
Sophomore	282	10	3	1	6
Freshman	352	14	6	4	4
Total number	1023	39	11	9	19

CHART III.

GOUCHER STUDENTS 1920-1924	ENTRANCE RECORD, "NO DYSMENORRHEA," "OCCASIONAL" IN COLLEGE	ENTRANCE RECORD, "DYSMENORRHEA OCCASIONAL"	NO ABSENCE IN COLLEGE	NOT MORE THAN ONE ABSENCE	TWO OR MORE ABSENCES
Senior	19	31	16	8	7
Junior	32	33	13	11	9
Sophomore	31	61	37	19	5
Freshman	18	64	45	17	2
Total Number	100	189	111	55	23

## SUMMARY

Over against 100 who had never had dysmenorrhea on entrance but who developed occasional dysmenorrhea in college, we find the following figures:

Of 228 with a history of "dysmenorrhea always" or "occasional" on entrance, 122 show no absence in college for dysmenorrhea. Of the remainder, 64 have but one absence and only 42, two or more.

In none of the resident students from 1920 to 1924 has dysmenorrhea been of such a severe type that it was not relieved by rest in bed, heat and simple analgesics. Insufficient study of endocrine therapy at Goucher has yet been made for any conclusions of value on this form of treatment.

All students at Grinnell must meet the requirement of three hours weekly in physical training or an assigned substitute. Sports such as grid football, basket ball, baseball, tennis, swimming, dancing and horseback riding are engaged in by those who are physically fit.

Most of the students with dysmenorrhea filled out questionnaires on their menstrual history and habits of personal hygiene. About half were assigned special exercises to develop the abdominal type of breathing. Students with severe, persistent dysmenorrhea were referred to gynecologists for examination.

In looking for etiology in the occasional dysmenorrhea there is a tendency to draw *post hoc ergo propter hoc* conclusions. We can easily find types with poor posture, weak abdominal muscles, respiratory disturbances, untimely meals, poor personal hygiene, poor nutrition or constipation. Improvement in one or more of these conditions may be followed by relief of dysmenorrhea, but an equal number of control cases in the college group may be found in which exactly similar conditions exist without dysmenorrhea.

Examining a very small number of cases traceable to local pelvic disorders, the etiology of dysmenorrhea in this college group remains obscure. Let us take a few typical histories from the senior class:

B. B., 21 yr. senior, history of "dysmenorrhea always" on entrance. Constipation, midnight, poor abdominal muscles, untimely meals. Gained seven pounds in college, posture improved. Only one absence for dysmenorrhea during five years in college.

S. M., 20 years, senior, history of "dysmenorrhea always" on entrance. Constipation, midnight, poor posture. Gained eight pounds. Two absences for dysmenorrhea in five years at college.

L. W., 20 years, senior, history of "dysmenorrhea always" on entrance. Midnight twinges, poor posture, respiratory disturbances. Marked improvement in abdominal muscles in spite of special exercises. Gained ten pounds. Two absences for dysmenorrhea in five years at college.

D. W., 20 yr. senior, history of "dysmenorrhea always" on entrance. Poor posture and respiratory disturbances. Improvement in posture. Three absences for dysmenorrhea during five years in college.

E. A., 20 years, senior, history of "dysmenorrhea always" on entrance. Respiratory disturbances, weak abdominal muscles. Improvement in posture. No absences for dysmenorrhea during five years in college.

E. H., 20 years, senior, history of "dysmenorrhea always" on entrance. Weak abdominal muscles. Marked improvement in muscles. No absences for dysmenorrhea during five years in college.

R. L., 20 years, senior, history of occasional dysmenorrhea on entrance. Poor posture, large untimely meals, respiratory disturbances. Trouble removed in 1932. No absences for dysmenorrhea in five years at college.

C. C., 20 years, senior, history of occasional dysmenorrhea on entrance. Poor posture, untimely meals, poor nutrition. Trouble removed July 1932. Gained eleven

pounds. Posture improved. No absence for dysmenorrhea after summer 1922. One in first year.

M. H., city student, history of occasional dysmenorrhea, on entrance. Circulatory disturbances, weak abdominal muscles, poor personal hygiene. Above conditions improved. Three absences for dysmenorrhea during four years in college.

H. N., city student, history of occasional dysmenorrhea, on entrance. Weak abdominal muscles, vasomotor disturbances, poor personal hygiene. Improvement in above. No absence for dysmenorrhea in four years in college.

A. V., resident student, history of occasional dysmenorrhea, on entrance. Weak abdominal muscles on entrance, poor personal hygiene. "Afraid of being fat." Underweight. Lost eleven pounds. Posture improved decidedly. Three absences for dysmenorrhea in fourth year at college.

L. L., resident student, history of occasional dysmenorrhea on entrance. Underweight, weak abdominal muscles, unhealthy tonsils. Gained seven pounds after tonsils were removed. Posture improved. No absences for dysmenorrhea in four years in college.

M. G., resident student, history of occasional dysmenorrhea, on entrance. Posture good, tonsils unhealthy, vasomotor and circulatory disturbances, poor personal hygiene, poor nutrition. Gained four pounds. No absence for dysmenorrhea in four years in college.

M. C., resident student, history of occasional dysmenorrhea on entrance. Tall thin type, poor posture, vasomotor disturbances, "always tired." Abdominal muscles improved. Three absences for dysmenorrhea during four years in college.

M. C. C., city student, history of occasional dysmenorrhea, on entrance. Had freshman year at another college where she went in for athletics. Spent two hours daily on train coming to Goucher. Little time for athletics. Slump in posture. Four absences for dysmenorrhea during three years at Goucher.

A. E., city student, history of "dysmenorrhea always," on entrance. Good posture, bad personal hygiene. Irregular eating and sleeping. "Afraid of getting fat." Thought she must go out every night for entertainment. No dysmenorrhea at camp in summer. Dysmenorrhea always at other times. Three absences in four years at college.

V. K., city student, history of occasional dysmenorrhea. Constipation, chronic appendix trouble. Vasomotor symptoms, good posture. Constipation improved. Six absences during first three years for dysmenorrhea and two in last year.

H. L., city student, history of occasional dysmenorrhea on entrance. Some toxic symptoms, posture good. Lost four pounds in weight, slumped in posture and personal hygiene. Four absences for dysmenorrhea in four years in college.

M. R., city student, history of occasional dysmenorrhea, on entrance. Toxic symptoms, chronic appendix trouble, poor personal hygiene, good posture. Five absences for dysmenorrhea in four years in college.

M. L., resident student, history of occasional dysmenorrhea, on entrance. Weak abdominal muscles, vasomotor disturbances, poor personal hygiene. Posture not much improved. Four absences for dysmenorrhea in four years in college.

B. L., city student, history of occasional dysmenorrhea, on entrance. Very poor posture, poor nutrition, vasomotor disturbances, poor personal hygiene. Posture improved. Gained five pounds. One absence for dysmenorrhea in four years.

M. R., resident student, history of occasional dysmenorrhea on entrance. Weak abdominal muscles, poor posture. Thought special exercises helped her. Two absences for dysmenorrhea in four years.

While weak abdominal muscles appear to be the most common finding in these cases, some students with perfectly good muscles report occasional dysmenorrhea.

In all the student interviews an attempt was made to change the student's attitude toward herself. One in her freshman year admitted that she was glad of an excuse to stay in bed with dysmenorrhea and get out of the rush of college life once a month. Others admitted that they were always expected to go to bed at home; their mothers did before them. Some became ashamed of this record.

Is not the improvement in dysmenorrhea to be traced rather to a stiffening in "back bone" than abdominal muscles; to the development of a point of view that looks with scorn upon a life of physical handicap?

Undoubtedly the satisfying and interesting life which most college girls enjoy makes them eager to have good health. If, in working for improvement in general health and hygiene their dysmenorrhea improves, how shall we determine whether it is special exercises or mental attitude that effects the cure?

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## RECENT ADVANCES IN OUR KNOWLEDGE OF OBSTETRICS AND THEIR BEARING ON OBSTETRICS AS A SPECIALTY\*

By A. J. SKEEL, M.D., CLEVELAND, OHIO

AVAILABLE data on maternal mortality and morbidity in obstetrics not only show slight improvement in recent years, but reveal the fact that when we put our statistics beside those of other highly civilized countries, we occupy a position near the foot of the list. This of course, does not demonstrate conclusively that we are not improving our obstetric art.

Could similarly accurate criteria be presented for late maternal invalidism, for injuries to the child at birth, for craniotomies and embryotomies, for decrease in the number of stillbirths, etc., we should unquestionably be able to show marked improvement.

In the larger medical centers more careful supervision of pregnancy has definitely reduced the incidence of eclampsia. The fact is, that in recent years attention has been focused on the baby and its welfare more than on that of the woman. Moreover, recent improvements on behalf of the mother have been directed toward the prevention of morbidity, rather than toward the reduction of mortality. The prevention of eclampsia, of course, improves the figures for both the mother and child.

Cesarean section has been rendered quite safe, but this change has

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\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.



improved the infant's chances much more than that of the woman, since we now elect to do a cesarean operation where formerly craniotomy or embryotomy was performed.

Our supposedly slow progress in the last two decades has therefore been more apparent than real, because it has been made along lines not so readily revealed by statistics, as is that of maternal mortality.

Vesicovaginal fistula, formerly so common, was until recently the cause of untold suffering among childbearing women. Thanks to improvement in the art of the accoucheur this condition has become quite rare.

Serious injuries to the baby's head caused by the application of high forceps, as well as the irreparable damage frequently done to the mother by the same procedure, have practically disappeared from the practice of the obstetric specialist, but still not infrequently occur at the hands of the family physician.

Third degree perineal lacerations whether due to narrowing of the pubic arch, or to lack of care and skill in the use of the forceps, rarely happen today under the care of the skilled obstetrician. This injury is still disappointingly frequent in general practice. Lack of surgical skill prevents the general practitioner from repairing injuries to the cervix and upper genital tract at the time of delivery, while pelvic floor injuries involving the levatores ani are as a rule very poorly handled by him.

Failure by the general man to make an early diagnosis of complications of labor, such as prolapsed cord, malpositions and presentations, and obstructing tumors, result in the neglect of timely life saving measures, and is the cause of countless obstetric tragedies.

The inability of the untrained accoucheur to competently handle the obstetric emergencies, such as placenta previa, postpartum hemorrhage and ablatio placentae, adds materially to the list of mortalities and increases the morbidity.

Failure to make early diagnosis of disproportion and faulty diagnosis of the station of the head in the pelvis, lead to ill-chosen attempts at delivery with ensuing complications that the best surgical skill can only palliate.

Attempts by the man of only average training to imitate Potter in his method of version, to follow DeLee in his plan for prophylactic forceps with episiotomy, or to do an untimely or ill-considered cesarean section, produce grave consequences that serve to still further emphasize the ever widening gap between obstetrics as practiced by the family physician, and the same art at the hands of the skilled obstetrician.

Recently DeLee has been urging that the classical cesarean operation be discarded, and that trachelolaparotomy be substituted for it in all cases. His figures show a decided reduction in maternal mortality by the use of this method of incising the lower uterine segment rather

than the upper one. The greater technical skill required for this operation forbids its use by the unprepared man, a circumstance which may fortunately result in the prevention of some of the frequent deaths now occurring from the classical operation, when performed by men of untrained obstetric judgement.

Transfusion of blood in cases of hemorrhage, a measure frequently resorted to by trained men working in adequate institutions is still another illustration of the surgical procedures demanded in obstetric practice. It is obviously impossible in family work.

I hope not to be misunderstood or misinterpreted. All honor to the family doctor, who cares for confinement cases, under all sorts of poor surroundings, at all hours of day and night, with poor light and untrained help. It is surprising that his results are as good as they are.

I do however wish to emphasize that obstetrics has become a surgical specialty, that the recent advances in obstetrics are practically all surgical, and that surgery of such a type as to demand the highest grade of technical skill, and the broadest and best trained surgical judgment. Whether all this surgery is well or ill-advised is another question. Often to refrain from operative interference requires infinitely more knowledge and experience than is needed to operate. The fact remains that trained surgical skill and comprehensive judgment and experience are prerequisite to modern obstetric practice of the best type.

Two plans present themselves for bringing to the patient this greater technical knowledge and skill demanded by modern methods.

One is to give to the average family physician better training than he formerly received. He handles the great mass of deliveries for the patients of modest means. By the efforts of various interested organizations much has been accomplished in this direction. No one who has had the opportunity to compare the work of the modern medical graduate with that of the men who began twenty or even ten years ago can fail to see the improvement produced by the better teaching of today. This will in time of course be reflected in our statistical data, and is of paramount importance.

The second method available is to bring the service of men already expert to a larger number of women. Indeed the primary purpose of the present paper is to urge the necessity for increasing the actual producing capacity (if one may be permitted to use a commercial term) of each specialist, so that more women may benefit by his skill. This seems particularly desirable for the great middle class, to whom for financial reason, such service is at present unattainable.

Anyone who has considered our present system of conducting private obstetric practice must be impressed with the tremendous economic waste involved. I think you will all agree that the doctor engaged in this specialty is a very busy man if he accepts thirty cases per month, or an average of one a day, even if his work is limited to hospital de-

liveries. Although he may have an obstetric resident, and a well organized service, still his patient expects him to be within immediate call over a considerable period of time. This time must be spent at the hospital although the doctor may have no other work demanding his attendance there. Not only must he spend hours in this unprofitable way, but exactly as many of these hours are between ten p. m. and seven a. m., as between ten a. m. and seven p. m. To put the matter briefly, the number of patients that the obstetrician can accept is rigidly limited by his physical capacity for losing sleep, rather than by the amount of work that he could do, were the cases presented to him during a definite portion of the twenty-four hours. As we have previously stated, thirty deliveries per month makes a full schedule under these circumstances. If we compare such a schedule with that of the busy surgeon the contrast becomes at once apparent.

Why can the surgeon develop his clinical work to the point where he actually operates thousands of cases yearly, while the obstetrician must number his by hundreds? Why can he have material for inquiry, research and experience which makes him master of his art, while even the hardest working obstetrician is comparatively inexperienced? This is due entirely to the fact that the surgeon has so organized and systematized his work that he can go into his operating room in the morning, and with a corps of trained assistants he can remain continuously at work until finished. Some emergencies, it is true, must be done at night. But if for every six hours of daytime surgery he were obliged to do six hours of night operating, I believe even the most ambitious surgeon would decidedly reduce his daily quota.

This factor which so definitely limits the work of the obstetrician, not only brings the cost of his services beyond the means of the average patient, but it unfortunately seriously hampers him in the acquisition of experience and technical skill.

What surgeon could gain a reputation for great knowledge if he operated an average of one case daily? Not only is the obstetrician thus limited, but the majority of his cases are normal or nearly so, and consequently play a minor part in developing his diagnostic ability or improving his surgical skill.

The writer wishes to urge the adoption, in our larger centers of population, of a definite plan for so conducting obstetric practice, that a larger number of women, in modest circumstances, may be delivered by the expert accoucheur. This could be accomplished by the grouping of experienced obstetricians for this purpose, each man retaining his own patients who are able to pay for individual service. The plan would require at least two and perhaps three experienced men in the group, who could arrange for alternating the hours on duty to suit their convenience. Two men might alternate day and night service every other month. Any obstetrician could readily care for one or two extra patients daily, if the actual delivery occurred during his hours

on duty. Thus the patients of the group would be divided into two distinct classes.

1. Those financially able to command the service of the individual obstetrician, whether by day or night.

2. Those to be confined by the one of the group who happened to be on duty at the actual time of delivery.

Such a plan would serve the twofold purpose of great reduction of cost, to those least able to pay, while it would give to the accoucheur increased opportunity for his own technical improvement.

As the clinic developed reputation, pathologic cases would be referred more frequently. At such a clinic it would be possible to entertain a colleague at any time, with the assurance that he might observe actual operative procedures and newly developed methods, as surgeons habitually do. The development and training of younger obstetricians would be efficient, practical and thorough.

Such a plan the author believes would be a boon to the women whom it served, and would help to answer the criticism that we are not reducing sufficiently the mortality and morbidity of childbearing.

309 OSBORN BUILDING.

(For discussion see page 263.)

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## INSTITUTIONAL ANTEPARTUM METHODS APPLIED TO PRIVATE PRACTICE\*

BY JAMES A. HARRAR, M.D., NEW YORK CITY

THE extensive adoption of early antepartum care by various institutions, both lay and medical, has produced the most permanent advance in obstetric progress of recent years. By systematic use of simple routine procedures, beneficial results are being tabulated, the repeated recital of which cannot but attract the attention of the profession at large as to their value. Evidence is everywhere apparent to obstetricians that the chief obstetrical care of the average pregnant patient prior to the onset of labor consists in little more than entering her name upon the books. Physicians frequently are negligent in giving definite advice and in insisting upon return visits at proper intervals, and, if the woman looks healthy, in trusting to nature instead of to blood pressure readings and urine examinations.

While the active duties of the doctor during labor are of the ultimate importance to the welfare of the woman and her baby, we perhaps have not gone far enough in discussing the necessity of the anticipatory duties during pregnancy. We now group these anticipatory duties of the accoucheur under the heading of "prenatal care," an evolution of the old antepartum examination. By whatever name we

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\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, O., September 18 to 20, 1924.

call these services to the patient, proof is not lacking from many sources of the advantage of starting obstetric care at the beginning of pregnancy and continuing it up to term. Individuals have recognized this for years. A quarter of a century ago in an admirable article on the management of labor in private practice, Allen M. Thomas said, "It is in these wise directions and forethoughts for the anticipated labor that the science of modern obstetrics especially excels, and too much stress cannot be laid upon their routine practice."

At the New York Lying-in Hospital we admit emergency cases in labor as well as regular applicants who have received more or less prenatal care. For twenty-five years the chief service to the patient in the antepartum clinic has been the examination in the latter months. Two years ago follow-up visits were initiated, and for the past nine months the clinic has been conducted with intensive prenatal detail. The women are encouraged to apply early in pregnancy. Formerly they were postponed except for abnormality and told to return in the seventh month for examination. As soon as these women learned of the possibility of early registration and obstetric care they took prompt advantage of the opportunity. The daily attendance at the antepartum clinics has more than doubled in the past two years.

At the first visit—with obstructive clothing removed—the woman, properly draped, is subjected to the customary complete antepartum examination, including urine, blood pressure and the securing of blood for a Wassermann test. Instruction in hygiene and mode of living is given by the nurse while the patient is waiting for the examination, this instruction being completed, after the examination, to include advice toward the correction of any abnormalities found. Monthly visits before the sixth month and fortnightly visits after the sixth month are requested in normal pregnancies. If a patient fails to return at the appointed time, first a letter and then a nurse is sent after her. In abnormalities, especially of urine and blood pressure readings, more frequent visits are required at the judgment of the doctor. The records of the complete antepartum examination and all the notes on the return visits go to the delivery room with the patient on admission to the hospital, or on the out-door service to the patient's home in the tenements with the labor bag.

This naturally has necessitated a big increase in the demands on the laboratory and on the doctors' and nurses' time, but we have already profited to the following extent. The incidence of recognized severe toxemia as expressed in cases admitted to the wards for treatment has increased. In 1919 there were nine; in 1920, eleven; in 1921, twenty-eight; in 1922, forty-two; in 1923, thirty-one; and in the first six months of 1924, twenty-eight. While we have been discovering and recognizing more toxemias, we find to our great satisfaction the incidence of the convulsive type, eclampsia, has extraordinarily decreased. Formerly we would have forty and fifty cases every year,

but in 1919 we had but twenty-seven cases; in 1920, twenty-three; in 1921, twenty-two; in 1922, eight; in 1923, thirteen; and in the first nine months of 1924, nine. Perhaps an eclamptic convulsion can come without warning, but in a pregnant woman whose careful prenatal instruction has taught her proper living and on whose urine and blood pressure timely observations have been made, it is extremely rare. During six months in 171 emergency labors, one in every eighty-five had eclampsia, while in 2,515 regular applicants in the same period who had more or less prenatal care, only one in every four hundred and twenty had eclampsia. The latter all gave warning signs of a developing toxemia. We can by no means always prevent eclampsia, but we usually can anticipate its occurrence.

Analysis of our results show the stillbirth rate in the regular applicants with prenatal care to be but one-fifth of that in the emergency cases. A further study of stillbirths in both groups exhibits an equal diminution in delivery mortality, in macerated fetuses, and in babies lost by reason of prematurity. The delivery mortality in hospital obstetrics is, theoretically at least, approaching a minimum. Further refinements in method and perhaps new and more perfect operations for dystocia may come, but care and judgment in following the present known procedures should insure results approaching this minimum delivery mortality. The number of babies lost, however, by reason of prematurity, and the cases with macerated fetuses present an appreciable total toward the reduction of which we are still working. While the prognosis and treatment of pregnant women with positive Wassermanns is a big problem in itself, still to be solved, we also frequently find premature macerated fetuses with repeated negative Wassermanns in the mother. Some of these are due to toxemias, others to early cord accidents, monstrosities, and pathology of the placenta. As in the delivery mortality, here too will continue to be found a certain number of unavoidable stillbirths.

Vaginal smears for gonococci are taken in suspicious cases. Ophthalmia neonatorum is not the only serious complication for the baby in maternal gonorrhea. Some years ago I, in collaboration with R. W. Lobenstine, found in the babies of fifty mothers with active gonorrhea, the birth weight to average 300 grams below normal, the initial weight loss to be greater, and the time of return to birth weight longer than in babies born of normal mothers or even of mothers running a febrile course nongonorrheal in origin. It was also observed that babies were prematurely born in 22 per cent of gonorrheal mothers as opposed to our normal prematurity rate of 2.35 per cent. Discovery of either syphilitic or gonorrheal infection in the pregnant woman is at least indication for prompt and vigorous treatment.

Now if these are the results of instituting early obstetric care, and we have every reason to believe they are, surely physicians who fail to heed them are practicing slovenly obstetrics. Aside from the Was-

sermann test which in private practice will have to be adjusted to the individual clientele and employed with discretion, there is nothing that cannot be done by the average man in his own office. The equipment is simple. With a good pelvimeter, no other instruments are required that should not be in every doctor's hands. Much of the stock advice can be handed to the patient on a printed slip easy to obtain. Several simple and readable books on the subject may be procured for patients desiring them. It is office work. The time required is not excessive and who would not gladly spare it could one stillbirth or one case of eclampsia be avoided? Again, how much more can be accomplished in private practice, where the doctor's contact with the patient comes so much earlier, and the observations and the examinations are made by the man who will personally attend the confinement? Where the vaginal examination in the early months, for instance, can detect a possible retroversion of the pregnant uterus—a not infrequent cause of early abortion—manual correction of the retroversion, if necessary under gas anesthesia, and the wearing of a pessary until life is felt will usually prevent a miscarriage.

Another opportunity is that for the discovery and supervision of patients with heart disease. Every obstetrician should be acquainted with the signs of the usual impairment of functional efficiency of the heart in normal pregnancy; the slight breathlessness on exertion, chiefly on ascending an incline, and the tendency toward stasis at the bases of the lungs with crepitant râles that clear up on deep respiration. He should be able to recognize and discount the physiologic phenomena toward term, of basal systolic murmurs and displacement of the apex upward and to the left. With such knowledge he will be able to guard the potential cardiac against breakdown in compensation during pregnancy, the prevention of which will insure a safe delivery in the great majority of these women.

I need not dwell upon the abdominal palpation in the latter months, the observations upon the growth of the uterus and the position of the child, the pelvic measurements and the estimation of the internal shape and capacity of the entire birth canal, and the frequent urine and blood pressure examinations. The relief of minor discomforts, the cleanliness of the nipples, the manipulation of the flat and inverted ones, the necessary advice on balanced diet, frequent bathing, sufficient rest, proper exercise, clothing, and daily evacuations of the bowels; the defining of the danger signs of impending toxemia and miscarriage, the description of the onset of labor, together with the quizzing at the successive visits on the following of advice of the former visit, all go to the building up of a relationship between doctor and prospective mother that is invaluable. In no other branch of medicine does the patient suffer so long in the presence of the physician as when in childbirth, and in no other ordeal of her life is the confidence of the woman in her doctor put to a more severe test. This confidence will be estab-

lished by the repeated advice and encouragement offered at the antepartum visits.

In Thomas's article, previously mentioned, he adds:

"A wholesome general surveillance of the patient is continued throughout her pregnancy and her mental condition made a special object of solicitude. A good morale is instituted both by intelligent instruction of the patient, especially if she be a primipara, and thoughtfully shielding her from, or laughingly dispossessing her mind of all obstetric gossip; frequently reassuring her against demoralization from the instinctive fears and apprehensions for her safe delivery. The fact of the nobility of her undertaking is impressed upon her; wholesome pride inculcated in it, and she is quietly urged to a desirable reliance upon herself for its accomplishment."

100 EAST SIXTY-SIXTH STREET.

(For discussion see page 264.)

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## MALIGNANT ENDOTHELIOMA OF PERITHELIOMA TYPE IN THE OVARY\*

BY EDGAR F. SCHMITZ, M.D., F.A.C.S., ST. LOUIS, MO.

(From the Gynecological and Obstetrical Department of St. Louis University School of Medicine.)

IN presenting this case of malignant endothelioma of perithelioma type in the ovary, I am fully aware of the skepticism which some writers seem to have toward the very existence of such a pathologic entity.

The literature on the subject is extremely scant and confused; the histologic descriptions tremendously involved and the opinions expressed varied and shifting.

There is no doubt that many of the earlier tumors described as endotheliomas were in reality carcinomas or sarcomas, but since the very critical discussions of several authors, notably Ribbert and R. Meyer, more conservatism has been manifest in making this diagnosis.

The difficulty lies in the fact that these growths present a conglomerate cell picture and structure, which tend toward a sarcomatous or carcinomatous type, and make the personal equation a predominant factor in their interpretation, and the additional obstacle exists that perfectly clear-cut cases are rare indeed.

In a discussion of these tumors we are confronted with a series of tissue changes which must be studied from two angles before any conclusion as to the nature of the growth can be arrived at. First,

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the histogenesis of the malignant cells, and second their morphologic characteristics.

Perhaps a short review of the development of endothelial tissue would help toward a clarification of the changes involved, and in some measure explain the dual characteristics of the cell picture.

In the embryo, mesoderm lies between ectoderm and entoderm and owes its origin to cells, which have split off from both of these layers. Subsequently the mesoderm splits into several divisions, one part differentiating to form kidney and uterus with their epithelial secretory structure; another produces muscle and connective tissue, and lines the body cavities; a third groups itself around a central canal and ultimately goes to form heart, blood and lymph vessels, and their respective linings.

We see then that the cells which line the blood and lymph vessels are derived from a tissue (mesoderm) which has a common origin from primitive layers, which form epithelial structures, while the mesoderm in addition forms connective tissue, etc.

Thus endothelial cells are intermediate between epithelium and connective tissue, and the dual tendencies of these cells, under pathologic conditions, to approach one cell type or the other, becomes clearer.

In these tumors two morphologic characteristics may therefore be expected. First, those changes which approach to a greater or lesser degree the sarcoma type; and secondly, those that more closely simulate carcinomata. Histogenetically, both types of cells must be derived from endothelium.

Following a rigid critique of these peculiar tumors by several investigators, grave doubt has arisen as to the existence of any genuine endothelioma of the ovary. Ribbert has stated, that the endothelial origin of any ovarian tumor while possible is unproved, and R. Meyer is disposed to discard the entire group, but still admits that such tumors can exist.

Feeling that I have in my possession sufficient autopsy and microscopic evidence to warrant a diagnosis of malignant endothelioma of perithelioma type in the ovary, I herewith present the following case:

M. L., age seventeen, colored, married, entered the hospital on January 13, 1923, with the following history:

Two months previous to admission, she had noticed that her abdomen was slightly distended. This enlargement was progressive and rapid, and pain, which began shortly after the symptoms were first noticed, became more severe.

The menstrual history was perfectly normal, the last period having occurred two weeks before admission, lasting four days, with only a scant flow.

She had one child, living and well, twenty months old; no miscarriages, no operation, no serious previous illness.

The physical examination showed a well developed, well nourished female, with a markedly distended abdomen, due to a firm tumor mass, which extended well above the umbilicus on the left side, and completely filled both lower quadrants.

Pelvic examination showed the cervix adjacent to a mass from which the corpus uteri could not be outlined. The tumor completely filled the pelvis and extended high into the abdomen, as previously described. No fluctuation could be elicited. The percussion note was dull, and the growth could not be moved. Wassermann, plus; leucocytes 12,800; urine negative.

Preoperative diagnosis, ovarian cyst. The patient was operated on January 19, 1923, with the following findings: free fluid in the peritoneal cavity. A large tumor, with glistening bluish-white surface, appeared in the wound. The uterus was pushed forward by this mass and lay immediately under the peritoneum. Two distinct growths could be palpated when the hand was placed in the abdomen, one to either side of the uterus, the right being much the smaller. The tubes on both sides were tightly spanned across the tumors and no normal ovarian tissue was visible.

An attempt was made to raise the mass, but the tissue began to tear badly. A trocar was next inserted to draw off some fluid, but only a few drops were obtained. The broad ligament was now split, and an attempt made to shell out the tumor. This proved to be impossible, as the tissue crumbled and came away in handfuls, with severe bleeding. Because of the nature of the mass—it was evidently malignant

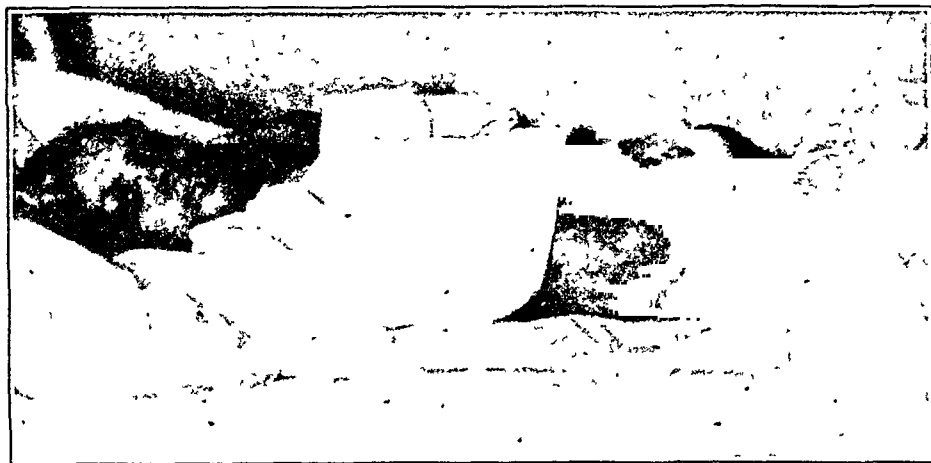


Fig. 1.—Mass protruding through abdominal wound twenty days after operation.

—it was deemed inadvisable to go further with the operation. The tumor cavity was packed with gauze, the end of which was brought out through the abdominal wound, and the abdomen closed. No evidence of metastatic or extension growths was noted on the peritoneum, or visible intestine at this time.

Postoperative diagnosis, bilateral ovarian cyst, malignant.

On January 22, the gauze pack had been entirely removed from the wound. On January 27, eight days after the operation, the neoplastic growth was seen pushing its way upward through the wound. On February 8, the mass had reached the size which is seen in the accompanying photograph. (Fig. 1.)

On February 10, she received her first dose of deep x-ray therapy, which had no effect on the growth. February 28, one month and fifteen days after entering the hospital, the patient died.

In the meantime, a pathologic examination of the material removed at operation had been made by two pathologists, and both independently reported, perithelioma.

A very careful autopsy examination was made, which revealed the following findings, which for sake of brevity, have been summarized.

There was an unhealed incision in the mid-line, through which a soft succulent tumor mass, about the size of a large orange protruded. This growth proved to be an extension or metastasis of the primary tumor in the mesentery, and was sur-

rounded on three sides by small intestine. The adjacent gut was adherent, black, and gangrenous. The abdominal cavity contained 100 c.c. of a milky white fluid, and metastases were seen growing throughout the belly. The pelvis, and a good part of the abdominal cavity, was filled with a growth which was white, soft, succulent, brain-like, and easily torn off, even in the customary manipulations. This tissue so completely filled the pelvis that anatomical relationships were lost. The uterus was well forward, the posterior surface seemed congested, and had an inflammatory appearance. On section the uterine cavity and wall appeared negative, except for the thickened serosa, just mentioned.

It was impossible to demonstrate the adnexa on either side, so completely had the growth obliterated all anatomical structures.

The stomach was negative; small intestine showed an area of gangrene, and many metastatic or extension growths. These same growths were found on the large gut, which was also displaced, due to tumor pressure.



Fig. 2.—Tumor cells almost completely replacing vessel wall, assuming an epithelial character.

The liver, pancreas, heart and thyroid, were negative. Chronic passive congestion of the lungs was seen, together with a pulmonary embolus on the left side. The kidneys showed cloudy swelling, and the ureters indicated changes which were due to chronic obstruction.

Causes of death were—(1) perithelioma, (2) pulmonary embolism; (3) chronic peritonitis; (4) gangrene of the intestines.

I have presented at some length the autopsy findings in this case, because it is important to rule out any tumor growing elsewhere in the body, and secondarily invading the ovary. Such neoplasms have caused considerable confusion in the literature, especially those arising in the stomach.

In discussing the histologic appearance of the various sections taken from the tissue in this case, several striking features present themselves, on which the diagnosis was made.

First, the peculiar and intimate relationship of the cells to the blood

vessels; in some areas, these tumor cells almost completely replace the vessel wall, assuming an epithelial character, causing a proliferation of the endothelial cell lining, and arranging themselves in stratified layers in a radiating fashion about the lumen (Figs. 2 and 3). Or,

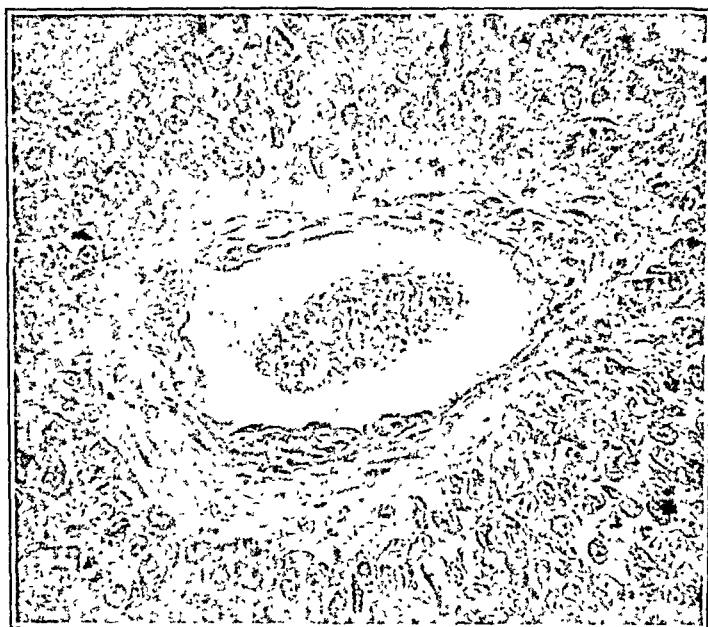


Fig. 3.—Higher power of Fig. 2, showing character of cells and endothelial proliferation.



Fig. 4.—Grouping of cells about blood vessels.

they arrange themselves in whorls or chain-like formations of several layers about other vessels, again causing proliferation and desquamation of the lining endothelium, which swollen and enlarged endothelium, takes on the character of the tumor cell, and seems to blend gradually into this cell type (Figs. 4, 5 and 6).

In other sections the tendency toward vacuolization can be distinctly seen. These vacuoles seem to form in the cell cytoplasm, and gradually coalesce with one another to form irregular spaces and



Fig. 5.—Concentric chain-like formation; proliferation of endothelium which takes on character of tumor cells.

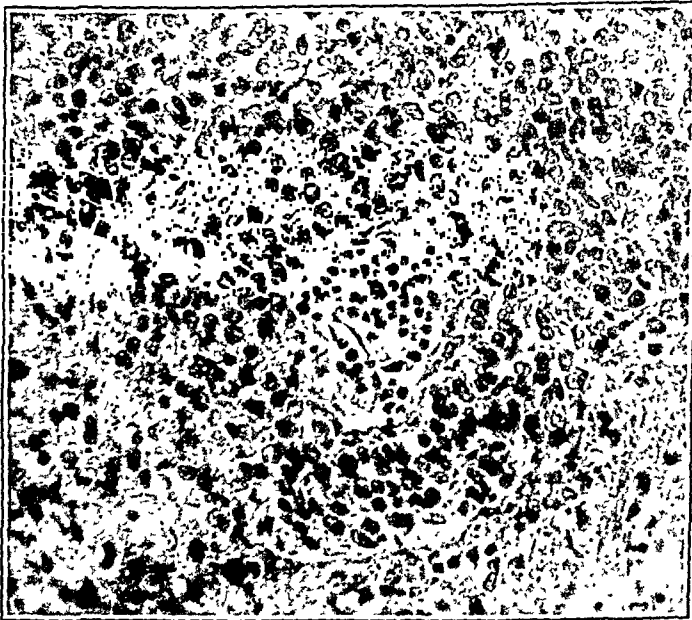


Fig. 6.—Stratified, radiating cell formation about thrombosed vessel. channels which the tumor cells endeavor to line, at the same time in places taking on the original elongated endothelial characteristic (Fig. 7).

Again we have portions of the tumor which are striving to assume a cell structure which closely resembles the sarcomatous type, although the polymorphic cell picture still predominates (Fig. 8).

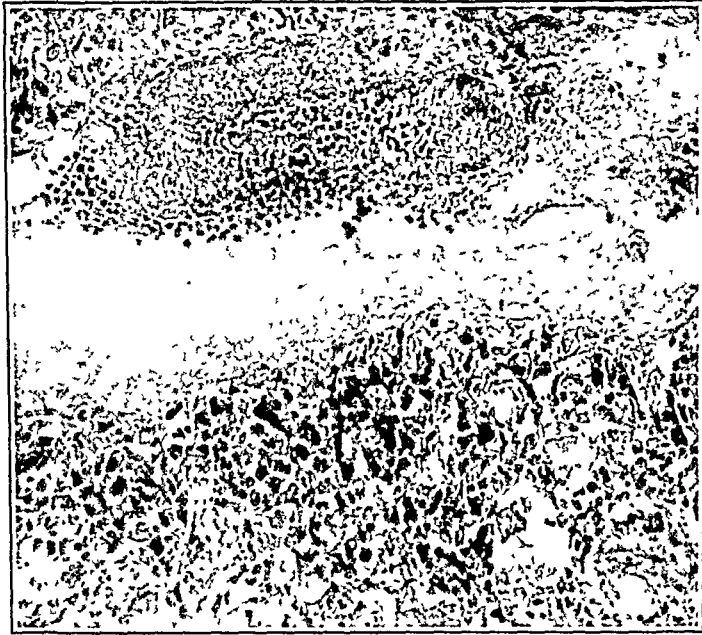


Fig. 7.—Vacuoles coalescing to form spaces which endothelial tumor cells endeavor to line.

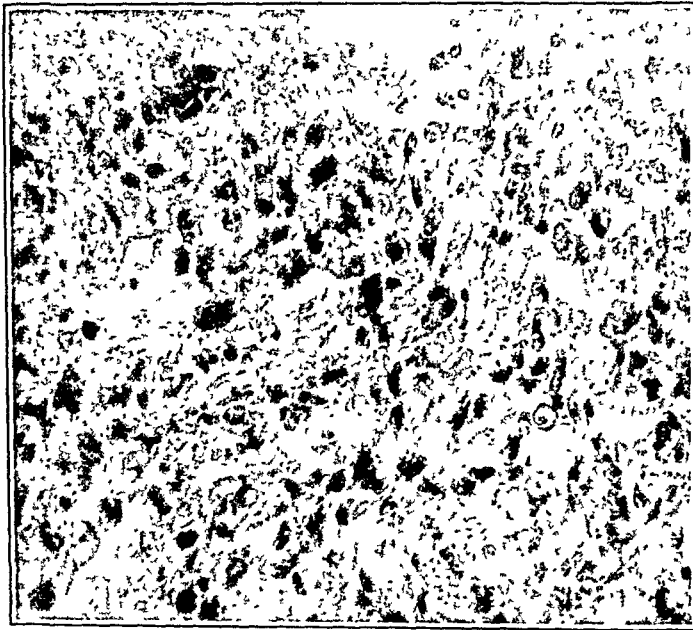


Fig. 8.—Tumor cells assuming a structure closely resembling sarcoma.

Finally, we have one slide which shows a structure such as I have been unable to find described in any text. A careful search of the literature failed to produce an illustration which even faintly resembled it. In Figs. 9 and 10 a vessel can be seen whose wall has been almost entirely replaced by cells of endothelial tumor type, the lumen being

preserved. In the wall, however, some five or six clear spaces present themselves which are surrounded by cell clusters in radiating or ring-like formation, which seem to spring from these spaces. These clefts I have taken to be the lymph channels in the vessel wall which have

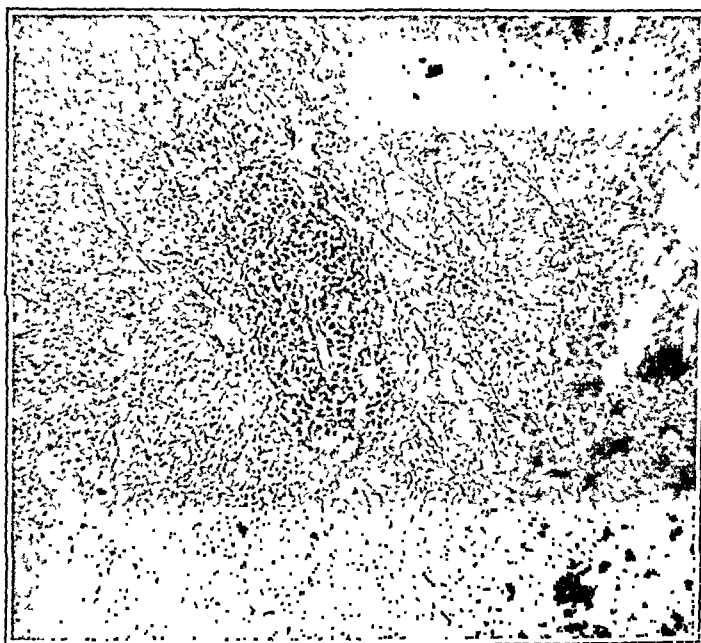


Fig. 9.—Tumor cells surrounding lymph spaces in vessel wall.



Fig. 10.—Higher power of Fig. 9. Vessel lumen well preserved.

become markedly dilated, and from which the actual tumor growth seems to arise.

All of these varied pictures occurred in three sections, two of which were taken from the tissue removed at operation (Figs. 2, 3, 7, 8, 9 and 10) the third being from an extension or metastatic growth in the small bowel (Figs. 4, 5 and 6).

That this tumor was located in the ovaries seemed perfectly clear to me at the time of operation, for the masses on both sides still roughly resembled the ovary, both in contour and position. One could clearly see both fallopian tubes stretched across the anterior surfaces of the tumors from which they could be easily separated. Had the tumor come primarily from a structure in the broad ligament, I feel certain that some vestige of an ovarian structure would have been visible on one side or the other.

We have then, a growth which tends toward a sarcomatous and carcinomatous type in one and the same section, which arises from the endothelium of the lymphatics, arranges itself in concentric, perivascular cell groups, has the polyhedral or cuboidal, always polymorphic cell type, and is of a malignant character.

The arrangement in whorls or chains, the tendency to formation of vacuoles which coalesce to form new spaces, seemingly lined by tumor cells, all these points seem to indicate that the diagnosis of malignant endothelioma of perithelioma type, is here justified.

I am deeply indebted to David H. Dolley, Professor of Pathology at St. Louis University, for his kindness and help in the study of the pathologic material presented in this paper, as well as for the original tissue diagnosis.

I wish also to express my thanks to H. P. Muir, now of University of Missouri, Columbia, for his painstaking and very complete autopsy report, and to C. W. Schery, of the City Hospital, for his examination of the original tissue in the diagnosis of which he independently confirmed our findings.

501 METROPOLITAN BUILDING.

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## CONTRACTIONS OF A NONPREGNANT MULTIPAROUS HUMAN UTERUS

By M. PIERCE RUCKER, M.D., RICHMOND, VA.

A NUMBER of observers, notably Kehrer,<sup>13</sup> Franz,<sup>6</sup> Keiffer,<sup>14</sup> Jaub,<sup>12</sup> Fellner,<sup>4</sup> Langley and Anderson,<sup>17</sup> Gunn,<sup>8</sup> Dale,<sup>3</sup> Blair,<sup>1</sup> and Keye,<sup>15</sup> have published studies of the contractions of the uterus of animals. These authors used either strips of tissue as in the ordinary muscle preparation, or else observed the organ *in situ*. Helme<sup>10</sup> studied the excised sheep's uterus perfused with Locke's solution and Kurdinowski<sup>16</sup> the uterus of dogs in the same manner. In two instances he observed the entire act of parturition after the uterus had been removed. Cushny<sup>2</sup> found that the pregnant uterus and usually one that had been pregnant, underwent regular rhythmic contractions. The virgin uterus, however, when the abdomen was opened under warm saline, showed no movements. When the virgin uterus was exposed to air or handled roughly, it also showed contractions. Recently Keye<sup>15</sup> and Blair<sup>1</sup> have shown that in the domestic pig and in



the rat there are two types of spontaneous contractions of the non-pregnant uterus, large and small. Keye<sup>15</sup> states that "during the time the graafian follicles are maturing and for a short time after they burst, contractions of the major type predominate. When the corpora lutea reach maturity and up to a time shortly before they retrogress, the minor contractions predominate or are present alone."

Franz,<sup>6</sup> Gunn,<sup>7</sup> and Flury<sup>5</sup> have studied the contractions of strips of human uterus, both pregnant and nonpregnant. Schatz,<sup>20</sup> Polailon,<sup>18</sup> Hensen,<sup>11</sup> Haskell<sup>9</sup> and Rucker<sup>19</sup> have published tracings of contractions of the pregnant human uterus. I can find no record of any

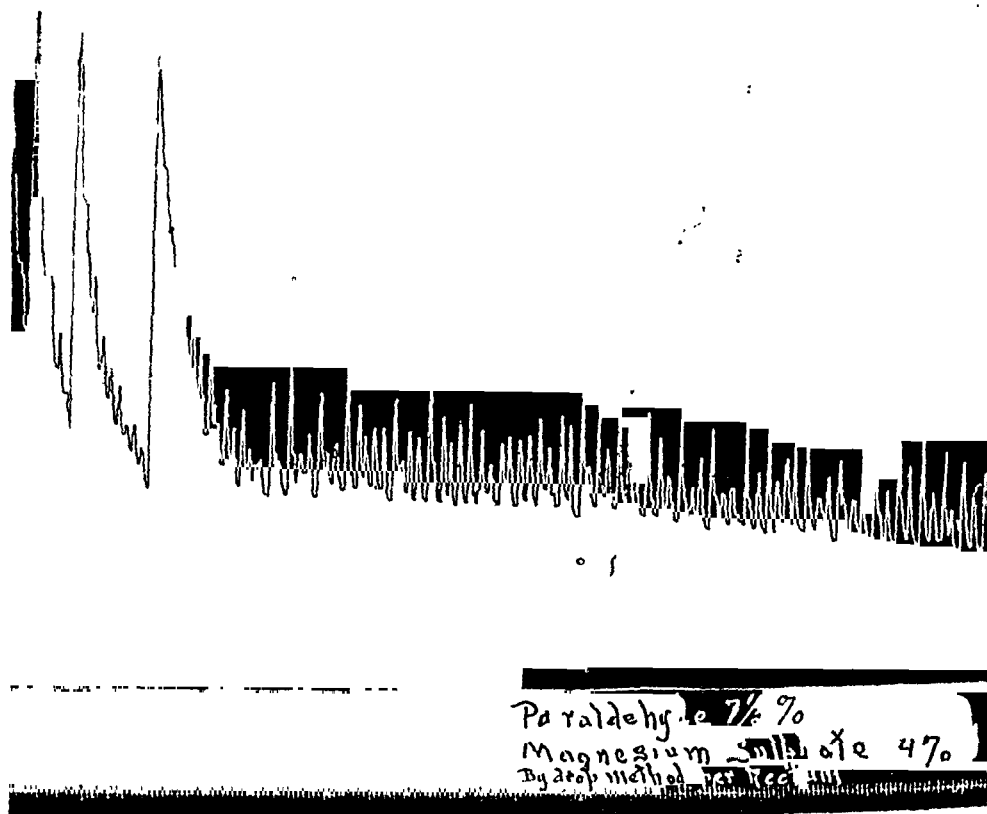


Chart 1.

observations upon the contractions of the nonpregnant human uterus *in situ*.

The accompanying hystero-gram was obtained from a patient who was sent into the hospital with a diagnosis of inevitable abortion. She had missed four periods and had been bleeding for a week. Her doctor packed her with gauze two days before she entered the hospital and again the day before she came in. When she entered the hospital a blood stained strip of gauze was removed from the vagina. The external os was open, but the internal os was firm and only slightly dilated. Under the impression that the patient was pregnant, I dilated the internal os with a Goodell's dilator and introduced a No. 2 Voorhees bag. I was unable to get the bag completely

within the uterus. It was partially filled with water under a pressure of 250 mm. of Hg. and connected with a kymograph. The bag adjusted itself so that the pressure fell to 106 mm. of Hg. Without disconnecting the bag from the manometer, I forced enough lysol solution into the system to raise the pressure to 256 mm. of Hg., but the pressure soon fell to 100 mm. of Hg. This was again repeated with the same result. Each time when the pressure fell to about 140 mm. of Hg. the writing point began to show uterine contractions. The contractions varied in force from 18 to 36 mm. of Hg. and occurred comparatively regularly at four minute intervals. The duration averaged two minutes. The relaxation was much slower than in a pregnant uterus and occurred in a jerky manner strongly suggesting the smaller contractions that Keye described in the nonpregnant pig. Unfortunately I was unaware of the true state of the uterus at the time and the drum was running much too slowly to show these minor contractions well. During the time the record was being made the patient was uncomfortable, but had nothing that could be construed as a true labor pain. She was given half ounce of paraldehyde by bowel which put her to sleep but which had no effect upon the uterine contractions.

When the bag came out there was enough dilatation to permit my exploring the uterine cavity with my finger. The cavity was smooth and only a little enlarged. It was curetted and the curettings showed microscopically very little endometrium. The glands were straight and were lined by low columnal ciliated epithelium, and the stroma was dense and compact.

It would seem therefore that the nonpregnant multiparous human uterus *in situ* is capable of rhythmic contractions under certain conditions. The contractions are comparable in both force and frequency to those that occur in the first stage of labor. They however, certainly in this case, differed in that the relaxation was slower and was accompanied by secondary waves. What part the gauze packing played in making the uterus more irritable is of course problematical.

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## A CASE OF PREGNANCY WITH HYMEN INTACT

BY NICHOLAS SCHILLING, M.D., NEW HAMPTON, IOWA

FELIX GAL of Budapest, (Klinik v. Toth), reports a case of "Empfängniss bei kaum wahrnehmbarer Hymenöffnung."<sup>1</sup> In the same volume, page 1262, Dr. Hans Brossmann, Jägerndorf, comments on Gal's publication and adds an observation on "Sectio caesarea bei Atresia Vaginae Congenita." In this connection the follownig report may be of interest:

On September 11, 1920, I had occasion to examine Mrs. T. C. O. Her general appearance did not indicate a very serious illness. She was a rather frail, blonde, intelligent American school teacher, twenty-five years of age. She had been married a month and her last menstruation had occurred August 1, six weeks before.

The menses began at seventeen. They had been regular, practically without pain, somewhat scanty in amount but rather protracted in duration. She gave a history of having had several attacks of bronchitis associated with pleurisy. The present illness had begun suddenly, a week before with nausea and vomiting of bilious material. These symptoms were quite persistent and they were aggravated by the smell of food. The patient complained also of headache, extreme weakness and some general abdominal pain. The bowels were regular. There was no bladder irritation or pain in the breasts.

The husband contended that pregnancy was out of the question because sexual intercourse had not been possible on account of obstruction at the entrance of the vagina. No bimanual examination was made at this time. Under general hygienic and dietetic treatment the patient improved.

The vaginal orifice was entirely occluded by an intact hymen. Near the middle two minute openings were finally discovered. Neither one would admit an ordinary surgical probe.

On October 14, under light ether anesthesia the occluding curtain was excised. Throughout its whole extent it was extremely thin and not very vascular.

The uterus was in normal position and in shape and size corresponded to that of a pregnancy of about two months. The cervix exhibited the characteristic softening.

On May 4, 1921, a full term female child was delivered, weighing 7½ pounds. It thrived at once.

Pregnancy associated with an unruptured hymen is a combination decidedly rare. In this instance it is not only surprising that conception occurred, but it is even more remarkable that it supervened so promptly after marriage.

Moreover, the case serves to emphasize the importance of conservatism in formulating medicolegal opinions in matters of this kind.

<sup>1</sup>Zentralbl. f. Gynäk., 1924, xlviii, 338.

# TORSION OF THE PEDICLE OF OVARIAN CYSTS

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(From the Department of Surgery and Gynecology, University of Virginia Medical School)

## INTRODUCTION

TORSION of the pedicle is the most common complication arising in cases of ovarian cysts. Olshausen in 1886, was the first to recognize this condition as a pathologic and clinical entity. A number of theories have been advanced as to the etiology of the condition, but so far none appear applicable to all or to the majority of cases. Most ovarian tumors are freely movable and attached to a fixed base by a pedicle; thus the mechanical conditions favor torsion. Small cysts with long pedicles are more likely to become twisted than the large relatively immovable tumors.

Recently our attention has been directed to this condition by the admission, within a few days of each other, of three cases of ovarian cysts, with twisted pedicles, to the University of Virginia Hospital. Looking back over the records, our series of eighteen cases, although small, appears to be worthy of an analysis to bring out points of diagnosis and symptomatology of this condition. Several of the cases are unusual and of enough interest to justify reporting.

## REPORT OF CASES

CASE 1.—*A right ovarian cyst with a twisted pedicle, in a girl ten years of age, diagnosed as appendicitis.*

The patient, a white girl, ten years of age was admitted June 14, 1914, complaining of pain in the right lower abdomen. In March, 1914, she had her first attack of pain in this region, accompanied by nausea and vomiting. Subsequently she has had three similar attacks, each of increasing severity. Pain became so severe that she was finally brought to the Hospital. Temperature 100.2° F., leucocytes were 14,600, and the urine negative. There was marked tenderness and muscle spasm in the right lower quadrant of the abdomen, most pronounced in the appendix region. There was no distention and no palpable masses. A diagnosis of acute appendicitis was made and immediate operation undertaken. Upon opening the abdomen a moderate amount of bloody fluid was found. The right ovary was cystic and about the size of an orange. Its pedicle was twisted twice. The cyst was bluish black in color and appeared to be undergoing gangrene. It was removed along with the right tube.

CASE 2.—*A cyst of the left ovary with a twisted pedicle causing symptoms simulating renal colic.*

The patient, a white married woman, thirty-three years of age, was admitted October 23, 1916, complaining of "kidney trouble." She had had four children and one miscarriage. There had been no menstrual disturbances. About six years prior to admission the patient suffered with an attack of severe pain in the region of the left kidney, which radiated around to the abdomen, down the course of the ureter to the groin and thigh. With this attack she had a chill, followed

by sweating, and was nauseated and vomited. There were no urinary symptoms. Since this time she has had a number of similar attacks, each accompanied by nausea and vomiting, but with no urinary symptoms. Pain was severe and required morphia. The attacks lasted from a few hours to several days. The present attack began about four days before admission with the symptoms mentioned above. There was some pain on voiding but no frequency of urination. Temperature on admission was normal. Catheterized urine specimen negative. Abdomen was negative. The left kidney could not be palpated and there was no tenderness in this region. Pelvic examination revealed a mass the size of a grape fruit, which appeared to be attached to the uterus and was thought to be a fibromyoma. Cystoscopic examination was negative. An exploratory laparotomy was advised. At operation a small amount of free fluid was found in the abdominal cavity. A cyst of the left ovary, about 12 cm. in diameter, its walls dark red, and its pedicle twisted three times was removed along with the left tube, the fimbriated extremity of which was plastered to the cyst. Palpation of the left kidney and ureter showed nothing abnormal.

*CASE 3.—A solid infected tumor of the right ovary with a twisted pedicle; localized peritonitis; infection caused by the typhoid bacillus.*

The patient, a white woman, twenty-six years of age, admitted August 23, 1921, complained of severe pain in the right lower abdomen. She had two children, the youngest was six months old. She had not menstruated since the birth of her last child. The patient had had some pain in the right lower abdomen for about a week, but severe pain did not begin until about fifteen hours prior to admission. This attack was accompanied by nausea and vomiting. Rectal temperature was 102.5° F., leucocytes 18,000, and the urine showed a large trace of albumin and a few hyaline and granular casts. The abdomen was markedly tender, rigid and a muscle spasm in the right lower quadrant extended beyond the midline. Pelvic examination was negative except for tenderness in both lateral fornices, most marked on the right. At operation there was an escape of a small amount of cloudy fluid on opening the peritoneum. The omentum, loops of small bowel and part of the transverse colon were found to be adherent to a mass in the pelvis. When the adherent viscera were freed a necrotic tumor of the right ovary with its pedicle twisted and surrounded by free purulent fluid was discovered. This tumor was thought to be a teratoma. Cultures from the peritoneal cavity showed *B. typhosus* in pure culture. The Widal reaction was positive. Examinations of the urine and stool were negative for the organism.

#### SUMMARY OF CASES

In our series of eighteen cases the ages of the patients ranged between ten and sixty-four. Six or 33 $\frac{1}{3}$  per cent were younger than twenty years; three or 16  $\frac{2}{3}$  per cent of the cases, were between 20 and 30; six, or 33 $\frac{1}{3}$  per cent were between 30 and 40; and the remaining three or 16 $\frac{2}{3}$  per cent were 45, 50 and 64 years of age respectively. Eleven, or 61.2 per cent were multiparae and seven, or 38.8 per cent nulliparae. Four, or 22.2 per cent of the cases operated upon were complicated by pregnancy of from one to four month's duration. In one case attacks started during pregnancy two months prior to delivery, and in another case the attacks started three days after delivery.

In thirteen, or 72.2 per cent, torsion occurred on the right side. Thirteen, or 72.2 per cent of the cysts were of the serous or pseudo-

mucinous type. Two, or 11.1 per cent of the tumors were not true ovarian cysts but arose from Kobelt's tubules of the fimbriated extremity of the oviducts. Of the remaining three cases, or 16.7 per cent, two were dermoid cysts and the other was a solid teratoma. The majority of the tumors were small or moderate in size, but several were quite large and reached almost to the costal margins.

The degree of torsion varied from one to four complete turns of the pedicle. All stages of degeneration of the tumors were found, from intense congestion, which was relieved when the torsion was reduced, to complete gangrene. Hemorrhage had taken place into the cystic cavities of some of the tumors. Free fluid was found in the peritoneal cavity in seven, or 38.8 per cent of the cases. This fluid was in most instances blood-tinged; in the case in which the cyst was infected the fluid was purulent. In seven, or 38.8 per cent of the cases, adhesions had formed between the cyst and other abdominal structures. Adhesions were very extensive in several of the cases involving omentum, small and large bowel. In one case the adherent appendix showed signs of a subacute inflammation.

Pain was the most constant symptom. It was present in all cases and varied in degree and character. In some, pain was so severe as to require opiates, while in others it was of a low grade. Some of the patients described their pain as sharp and lancinating, some as dull, some as dragging in nature and some as bearing-down in character. Pain started in the lower abdomen in fifteen or 83.8 per cent of the cases. It usually started in either the right or left lower quadrant, depending upon the location of the tumor, and in the majority of cases remained localized; but in some, pain became general across the lower abdomen or all over the abdomen. In three cases pain started either in the lumbar or kidney regions and radiated to the front of the abdomen. In three cases pain radiated down one or both legs. Nausea and vomiting was the most frequent symptom encountered next to pain, occurring in fifteen, or 83.3 per cent. Urinary disturbances principally dysuria and frequency were present in four, or 11 per cent. Five of the patients complained of constipation and one of painful defecation. The attacks were associated with amenorrhea in two patients.

Some distention of the lower abdomen was noted in fifteen cases. Of course in the cases in which the cyst was very large distension was correspondingly great. Tenderness, usually localized, was found in all patients. In six, or 33.3 per cent of the cases tenderness was accompanied by muscle spasm and rigidity. A mass was palpable on both abdominal and pelvic examination in sixteen, or 88.8 per cent. Only four patients had noticed a mass in the abdomen prior to admission. The temperature in the cases without infection varied from normal to 101.5° F; leucocytes from 8,000 to 20,400. The temperature was above

100° F. and the leucocytes above 10,000 in 64 per cent of the cases. Examination of the urine for the most part showed nothing abnormal, in a few of the older patients there were signs of a chronic nephritis, but no case showed evidences of an acute nephritis. Fourteen, or 78 per cent of the patients gave a history of previous attacks.

In this series a correct diagnosis was made in five instances: two cases were diagnosed as appendicitis, and three as appendix abscess. One case was believed to be a tuboovarian abscess, while in another the presence of a large fibromyoma of the uterus was recognized, but the complication of an ovarian cyst with a twisted pedicle was not suspected. No definite diagnosis was made in six cases.

All of the patients in this series were operated upon. There were no deaths and the postoperative course in the majority was uneventful. Pregnancy, where it was found as a complication, was in no instance interrupted.

From the analysis of our series of cases the clinical picture of a typical attack of torsion would be somewhat as follows: The patient, usually a multipara, is seized with severe pain, of a variable character, in the right or left ovarian regions, according to the side from which the tumor originates. Pain is followed shortly by nausea and vomiting. There is a history of previous attacks. The patient appears to be ill and in considerable pain. On examination, the lower abdomen is distended and at the site of the pain there is a tenderness and rigidity on palpation. A mass can be outlined which extends into the pelvis. This mass is tender and semifluctuant. On pelvic examination the mass can be distinguished from the body of the uterus and palpated in one of the lateral fornices. Temperature 100° F. and leucocytes 10,000. Examination of the urine is negative.

The treatment of these cases is by immediate operation, although the patient will usually recover from the attack without interference. However, attacks recur and very serious complications may take place. The prognosis in these cases treated by operation is good even though a complicating pregnancy be present.

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- (16) *Payr, E.*: *Deutsch. Ztschr. f. Chir.*, 1906, lxxxv.
- (17) *Pfannestiel*: *Veit's Handb. der Gynaekologie*, iv.
- (18) *Sanes, K. I.*: *Amer. Jour. Obst.*, 1915, lxxi, 76.
- (19) *Schultz*: *Diss.*, Strasburg, 1906.
- (20) *Wiener*: *Amer. Jour. Obst.*, 1915, lxxii, 209.

# Society Transactions

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## AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNE- COLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SEVENTH ANNUAL MEETING,  
*CLEVELAND, OHIO, SEPTEMBER 18-20, 1924*

DR. GEO. CLARK MOSHER, of Kansas City, as Chairman, presented his **Report of the Committee on Maternal Welfare.** (For original article, see page 269.)

DR. A. J. SKEEL, of Cleveland, Ohio, read a paper entitled **Recent Advances in Our Knowledge of Obstetrics and Their Bearing on Obstetrics as a Specialty.** (For original paper see page 239.)

### DISCUSSION

DR. GEO. CLARK MOSHER, KANSAS CITY, MISSOURI.—Dr. Skeel's paper covers in a very graphic manner the progress which has been made manifest in a number of lines of obstetric technic. Those of us whose memory runs back to the last part of the nineteenth century can well recall the frequency with which we came into contact with referred cases of vesicovaginal fistula. Nowadays, as Skeel says, this misfortune is a very rare occurrence indeed. Third degree lacerations still demonstrate that accurate measurements are difficult to make, and the accommodation of passenger to passage is fraught with maternal risk, but these are not so frequent as they were in the past. It would seem that the faulty application of forceps to the unrotated head in a posterior position is one of the gravest offences of the general practitioner of today. As Skeel suggests, the failure to make a diagnosis is more often due to indifference than to ignorance, and we must agree that this counts for much obstetric tragedy.

We also agree with De Normandie and Lynch when they say that we live in an age of hurry and hustle. Nobody has time to wait. Nature is too slow in her method of rotation, so on go the forceps with no regard for position or degree of dilatation. Truly, as Rudolph Holmes says, obstetrics is becoming a lost art, and mainly because of our impatience.

Now, as to the remedy, Skeel is in harmony with all the authorities quoted in our annual report on maternal welfare. Obstetrics is a surgical specialty. In a great many instances our maternity patients are far from being in a condition of physiologic health. The physician must be in every way competent to handle these cases which are surgical emergencies. Even more than this, he must have an obstetric conscience so that he may restrain himself from interference when this attitude is indicated. We must educate the family doctor to become a better obstetric diagnostician.

As to Skeel's proposed innovation of a twenty-four hour service divided into reliefs, each man taking the work coming up while he is on duty, thus conserving



his strength by limiting the hours in the hospital, one must be struck by the idea which would enable the family of moderate means to secure high class attention. It is hoped that Skeel may be able next year, during which period the system is to be installed, to report as to the practical result of the adventure.

DR. EDWARD SPEIDEL, LOUISVILLE, KENTUCKY.—We all agree that obstetrics is a surgical procedure. We also realize that an obstetric procedure is always performed under conditions so absolutely inferior to the splendid surroundings of the organized surgical operation that it is astonishing that the obstetric specialist succeeds even in the well-arranged maternity hospital. When you consider, then, that the majority of such obstetric procedures have to be performed in the house by comparatively untrained men, you can readily understand how much improvement is necessary in obstetrics.

Again, when you realize that the man who would hesitate to perform an appendectomy has no hesitancy whatever to perform any of the obstetric operations except perhaps cesarean section, then you can readily understand that such an attitude must result in a great mortality. The remedy for better obstetrics is, of course, that all of these operations be performed in good maternity hospitals, and that even if the maternity specialist is called in a private house to perform a delivery upon a complicated case, he would find it wisest under those circumstances to have the patient transferred to a hospital where better conditions prevail.

The idea of having a corps of physicians who relieve one another in obstetric cases, is to be desired, and if that can be accomplished it will result in much better work being done by groups of physicians than can be done by a single obstetrician at the present time.

DR. JAMES A. HARRAR, New York, read a paper on **Institutional Antepartum Methods Applied to Private Practice**. (For original article see page 243.)

#### DISCUSSION

DR. FOSTER S. KELLOGG, BOSTON, MASS.—I happen to be in charge of ten or twelve clinics to which there are 14,000 to 15,000 visits a year. The bulk of them are prenatal visits, and in addition we have a postnatal clinic, one cardiac clinic, and one toxemia clinic, which is a development of the prenatal clinic. I want to endorse everything Harrar has said, which has been found true in our experience.

PROFESSOR O. FRANKL, VIENNA, AUSTRIA.—In regard to what you say about syphilis, I would like to relate our experience of many years in Vienna. First, I made a systematic examination of pregnant women and gave them the Wassermann test. I found very many cases of latent syphilis where it would not have been suspected for there were no symptoms. During the past ten or twelve years during which period we have conducted these examinations, we noticed that positive reaction is reliable, but the negative is not. We sometimes see absolute negative reaction, and yet we discover latent syphilis. Indeed, there has been great progress made in this respect during the last years, and we affirm that we should always combine the Wassermann test with the Meinecke reaction.

DR. HARRAR, (closing).—We find that the hospital public, as we see it, is much better educated than the lay public in all matters of obstetrics. In addition to the antepartum clinic I have mentioned, we also run a cardiac clinic where from fifteen to twenty patients are seen twice a month. We also have a class for postpartum women. This class is held daily under the supervision of a nurse for ninth

day women who are going to be discharged. Instructions are given on the care and bathing of the breasts, explaining why they should be kept clean; time of return to marital relations; dressing and washing the baby. These women are woefully ignorant on these subjects, and are very much interested in everything we have to tell them.

At one of these classes the other day a woman sat crying during the entire period of instruction by the nurse, a half hour. It was feared for the moment that she had had a stillbirth and unfortunately had been sent down to this clinic by mistake to learn how to care for her baby. After it was over she was asked what the trouble was, and she said, "Nicht verstehen." The reason she was crying was because she had not understood any of the instructions spoken in English and she wanted so much to know. We can never be too careful in giving obstetric patients instruction in all hygienic details both before and after labor.

DR. FOSTER S. KELLOGG, Boston, Mass., read a paper entitled, **Further Studies of Recurrent Toxemias in Pregnancy.** (For original article see page 197.)

#### DISCUSSION

DR. JAMES A. HARRAR, NEW YORK CITY.—Kellogg helps to answer that question frequently put to us when a woman has toxemia and eclampsia, "Will she have it with the next pregnancy?" The compiling of case records will gradually help us decide on the individual case.

I desire to briefly mention two cases; a house surgeon at the Lying-In Hospital some years ago informed me that at his birth his mother had eclampsia, and she was not expected to live. She afterwards had five children without any recurrence of eclampsia. Another case indicates the opposite swing of the pendulum. A doctor's wife had convulsions. I delivered her and she recovered, also her baby. She became pregnant again in about four years, and with all the care we could give her, by the fourth month her blood pressure had reached 180, she had blood in her urine, and we had to induce labor. It is very hard to decide the question we have put to us, but by getting these cases recorded we will gradually lead up to prognosis on the individual case.

DR. KELLOGG (closing).—We carry out blood chemistry, liver tests and kidney tests, and have continued them for about twenty months in all these cases; there are some eighty; and we thought we had something in the liver test last year. But the last seven months have shown disappointment. There isn't one absolute thing in blood chemistry as far as we can say, or in the kidney or in the liver tests. This work is purely clinical, but what we have been trying to do is the scientific work back of it simply to see if we can get something that will help us with these individual cases, and also get enough histories and enough cases grouped under the certain diagnosis headings to see if the preliminary observations are actually true.

# THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF NOVEMBER 11, 1924

THE PRESIDENT, DR. REGINALD M. RAWLS IN THE CHAIR

## DR. HENRY C. COE presented a case report showing the Importance of Care of the Mouth before Operation.

Sister B. was operated upon July 22, 1924, by Dr. H. C. Chase at the Woman's Hospital for chronic appendicitis. The pelvic organs were found entirely normal. The wound healed by primary union. On the second day after operation the temperature rose to 101° F., and on the third day to 103° F., and the right parotid gland became swollen and painful. Pain was also referred to the ear and was severe enough to require morphine. The swelling of the face continued until the patient could not fully open her mouth and had to be given fluids through a tube. No fluctuation could be detected, but on July 29 a sudden gush of thick, yellow pus came from the ear, a culture from which showed *Staphylococcus aureus*. Two days later distinct fluctuation was present and an incision in front of the ear released over an ounce of thick, yellow pus. Examination of the ear showed an opening in the middle of the external auditory canal but there was no mastoid involvement and the drum was normal. Two days later the left parotid began to swell and a blood count showed over 38000 leucocytes with 96 per cent polys. Patient's general condition was rather poor. On August 4 the swelling on the left side was incised but no pus found. The right side required further incision to secure drainage. Final convalescence was slow and the patient was not discharged until September 8th, being at that time unable to separate her jaws more than an inch.

This patient had had the usual care of the mouth before operation and it would seem from the lesson of this case that an even more careful examination should be made of abnormal conditions and treated in advance of contemplated operation. It is also important that the anesthetist, as well as the nurse present during the recovery from the anesthetic, should not introduce infection into the mouth. Moreover, a mouth wash should be used as a routine during the first week after operation.

## DR. H. S. McCANDLISH presented (by invitation) a Report of 224 Cases of Impetigo in the Newborn. (For original article see page 228.)

### DISCUSSION

DR. HAROLD BAILEY.—It seemed to us that the striking thing about the epidemic was the fact that it did not effect the general health of the individual, except in those cases where there were large areas of exfoliation. The progress of the disease was in the form of an acute exfoliation, such as Ritter described, in which areas as big as the palm of the hand peel off the face and neck, down to small discrete vesicles. We have come to the conclusion, from clinical observation, that exfoliative dermatitis and contagious impetigo are the same disease.

DR. O. PAUL HUMPHSTONE.—We have had two or three epidemics in the Methodist-Episcopal Hospital of Brooklyn when our quarters there were more or less cramped. As a result of our experience with these epidemics we learned various practical things.

We employ in the observation of our babies, in the first place, the normal

nursery, and, in the second place, an observation nursery, and beyond that the isolation nursery. Any baby that develops the slightest irritation of the skin goes into the observation nursery. If this spot takes on a red base with a little bleb, the baby goes into isolation, no matter how small this may be. By that means and the sterilizing of the clothes of all the babies, we have now succeeded in the period of about a year in not having any impetigo in the hospital, except a spontaneous case now and then.

DR. FRANKLIN A. DORMAN.—A year or so ago there was a moderate, rather persistent epidemic of this infection at the Woman's Hospital. It was interesting to note that it started with a virulent case of the exfoliative type, which resulted fatally. This was followed by a series of these cases which seemed to decrease in virulence as time went on. However, one case developed a cellulitis. I think it is rather surprising that McCandlish did not see something of that sort in such a large series of cases. That is one of the dangers of this disease and may be fatal.

In the local treatment that we follow, we make no attempt to preserve the integrity of the bleb. As soon as we see blebs we clear out the fluid and apply picric acid. That seems to expedite the recovery and diminish the spread of other papules on the body.

DR. RALPH M. BEACH.—I have had an opportunity in Brooklyn to watch the evolution of the obstetric nursery in four or five different hospitals, in all of which we have had these different epidemics of impetigo. The one thing that seemed to impress me more than anything else in the prevention of the disease and the spreading of it to other infants, has been the use of the slab bath. The hospitals which did away with the tub for bathing babies got rid of their epidemics of impetigo first.

I want to make a plea for the use of mereurochrome in the treatment of these babies. Two per cent mereurochrome used as soon as the red spot appears, will prevent further developments, or if a bleb should appear, paint it with 2 per cent mereurochrome.

DR. W. C. JOHNSON presented (by invitation) **A Study of Pneumonia in the Stillborn and Newborn.** (For original article see page 151.)

#### DISCUSSION

DR. W. E. STUDDIFORD.—I think there are two or three factors of great practical importance. There is no doubt that many children have been lost by too vigorous attempts at resuscitation. With prolonged labor there is a possibility of amniotic fluid deep in the lung. If the child, when born, is held by the feet and allowed to drip and make its own efforts at resuscitation, the chances are that some of these pneumonias will be prevented.

The next question is of infection in the amniotic cavity, and the possibility of infection of the membrane, starting from the cervix, being responsible at times for premature rupture. Therefore, the handling of these cases with premature rupture of the membrane becomes more and more serious in the interest of the child. It is a question whether active interference is the best thing or whether we should go on in a passive way; but there is no doubt that the longer the membranes are ruptured the greater the chance of getting these pneumonias.

# Department of Maternal Welfare

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## ANNOUNCEMENT

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Under the above title we desire to introduce to the readers of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY a new department.

In several branches of modern medical practice there have been developed interests which are not technical, or broadly speaking, perhaps are not clinical and yet are of paramount importance to our profession and to the public at large. The latter in fact has taken a deep concern in such matters and as a result many lay organizations have been developed in recent years for the discussion and possible amelioration of problems that, while perhaps essentially medical, have a broader interest. One might thus refer to tuberculosis, cardiac disease, cancer, mental hygiene and other topics in which lay propaganda and participation sometimes outweigh and even displace a purely medical participation. Within recent years the specialty represented by this journal has been drawn into this field of lay activity and even the national government has attempted through the ministrations of the Shepard-Towner act to control or supervise the problem of so-called "better maternity care." That maternal morbidity and mortality from childbearing is undoubtedly high in this country, cannot be entirely denied, likewise that there is a deplorable loss of fetal life from abortions, premature labors and the accidents associated with childbirth. The correction of these problems must be approached from more than one angle. It cannot be solved except by a combination of forces, and the direction of these forces should rest in the medical profession itself,—which means better teaching of obstetrics, the continued attention of the practitioner to obstetric progress, the inclusion of more obstetric topics in the programs of our general medical societies and the education of the public to demand and to be willing to pay for better attention during pregnancy and labor. In all of this the medical man should be the guiding force and spirit, although lay participation is greatly to be desired and hoped for. One of the most significant developments in recent years is the recognition by our national societies devoted to obstetrics and infant welfare, of the importance of this matter by the appointment a few years ago of a joint committee to study ways and means of meeting the situation and to take steps if possible to improve the same in certain of its aspects and phases. This joint committee now consists of Drs. F. L. Adair, Minneapolis, Minn., Geo. C. Mosher, Kansas City, Mo., Henry Schwartz, St.

Louis, Mo., Ralph W. Lobenstine, New York, N. Y., Dr. Robert L. DeNormandie, Boston, Mass., and Geo. W. Kosmak, New York, N. Y., representing the American Gynecological Society, the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, and the American Child Health Association. This committee has developed a tentative program which has already been published on a previous occasion. (See this Journal, vol. v, p. 664, and vol. vii, p. 601.)

Believing that this important work will be forwarded by such publicity as may be secured through the pages of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, the necessary number of pages will be allotted each month to the activities of the "Joint Committee on Maternal Welfare" referred to above, and topics of allied interest.

We take pleasure in presenting therefore the report of Dr. George C. Mosher of this Committee, made at the last meeting of the American Association of Obstetricians and Gynecologists.

GEO. W. KOSMAK, M.D.

HUGO EHRENFEST, M.D.

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REPORT OF THE COMMITTEE ON MATERNAL WELFARE OF  
THE AMERICAN ASSOCIATION OF OBSTETRICIANS,  
GYNECOLOGISTS AND ABDOMINAL SURGEONS,  
CLEVELAND MEETING, SEPTEMBER, 1924

DR. GEORGE CLARK MOSHER, KANSAS CITY, MO., CHAIRMAN

The report of the Committee on Maternal Welfare for 1923 presented a comprehensive view of the conditions demanding cooperation in the work for better obstetrics, and suggested the plans proposed to help remedy a situation made manifest by the investigations of the committee.

At the Philadelphia meeting the enthusiastic reception accorded the report was most gratifying and surprising. Occasion is here taken to express to the Association the thanks of the committee for the appreciation of the importance of its function and the very generous proffer on the part of our Association of assistance for 1924.

Doubtless, growing out of the publicity given the reports of our meeting in Philadelphia, a widespread correspondence developed with lay organizations and individuals requesting information, verification of statements and reprints. These included such organizations as the Chicago Infant Welfare Society, which gave us a quarter page notice in their bulletin; the League of Women Voters, who requested a series of lectures on the subject among physicians in Illinois; the Mother's Day Organization, in Philadelphia, and other women's national associations. Mention is made of this lay interest in the report for two reasons: first, to show the concern of the laity in maternal welfare; second, to suggest the necessity for cautious deliberation on giving out statements to the public by the profession which are apt to be misunderstood.

It indicates, moreover, that the people must be taken into our confidence and taught what constitutes good obstetric care and not merely to be frightened with

alarming stories of suffering and death associated with childbearing. These educational facts are necessary to influence women to put themselves under the care of competent medical advisers early in their pregnancy, rather than to accept neighborly advice and have no supervision until labor is at hand.

The activities of the committee for 1924 have been centered in propaganda to stimulate a demand for better obstetrics on the part of the profession, appealing especially to those whose cooperation cannot fail to be of great importance. Such propaganda was undertaken by our own committee and in conjunction with the very capable committees of the American Gynecological Society, under the chairmanship of Fred L. Adair, of Minneapolis, and that of the American Child Health Association, in July.

A letter was formulated and sent out by the joint committee to the secretaries of all state medical societies as given in the directory of the American Medical Association. This made first an appeal for cooperation in stressing the value of more papers on obstetric topics on the programs of their annual meetings, and more discussion of problems of obstetric importance; and second, asked that each state secretary take up with the secretary of every constituent county society in his state a similar plan of increasing interest in maternal welfare. We hope to follow up these letters of state secretaries to the county societies with an additional communication from the joint committee, and are now receiving the list of county secretaries and writing them.

This method of propaganda, the joint committee hopes will be the opening wedge in breaking the vast mass of indifference which evidently is at the root of our present inert condition. Indifference is a greater obstruction to progress than ignorance.

In addition to this concrete action, the joint committee is endeavoring by a similar letter to engage the attention of the state boards of health through their directors of maternity and infancy welfare to establish a corps of regional consultants in obstetrics. The activities of this body are suggested by those of the one in Ohio, in which two of our Fellows, Arthur J. Skeel of Cleveland and Sylvester Goodman of Columbus, have done conspicuously good work; and that of New York under the active direction of our Fellows, John Osborn Polak of Brooklyn, George W. Kosmak of New York and James A. Quigley of Rochester.

These consultants aim to cooperate, in the efforts of the director with whom they act, to reach those communities where such aid is desired by the county medical society in holding clinics; to give their services when needed in difficult cases without compensation, if necessary; to address meetings and in every way further the cause in which they are interested. We are informed by Dr. Polak, that with an efficient director of maternity—such as that of New York, Dr. Florence L. McKay—the burden of the work is accomplished with comparatively little effort on the part of the board except moral support.

The committee urges further the value of the maternity centers in cities. According to the statement of the late Herman M. Biggs of the New York State Department of Health the work of the New York Division of Maternity and Infant Welfare has definitely reduced morbidity and mortality to such a remarkable degree that it is predicted that in carrying out its plans the deaths of mothers will be reduced 75 per cent, premature births 25 per cent and the death rate of early infancy 40 per cent.

Prof. Henry Schwarz, a member of the joint committee, has done conspicuous work of the same kind. He says: "I have always felt that the medical schools should furnish the opportunities for the training of doctors, nurses and public health nurses, by conducting a model obstetric center, giving ideal obstetric care to

rich and poor alike, including prenatal care and care for six weeks following delivery."

"I have been training nurses, doctors and midwives since 1880, and have built up such a center in St. Louis. Of course, such a center, like a model farm, can only act as an incentive to others to do likewise.

"I also hold that the committees should help the states to appreciate the benefits and possibilities of model obstetric centers in the remote and backward districts as object lessons, until the respective communities see the light and cooperate to continue such work at their own expense." The work of our own committee has been conducted along the same lines with that of the joint committee.

At the suggestion of our secretary, Dr. Davis, a reprint was made of the 1923 report. Copies of this were sent, as a follow-up to the letter of the joint committee, to the secretaries of the state medical societies, hoping to stress the urgency of the work and furnish a basis of discussion. Copies of the reprint were also sent to the editors of the medical press with a letter requesting that increased space be given to articles and meetings pertaining to obstetric technic. Also, copies were filed in each of the medical libraries of the United States.

The chairman of our committee was invited, in October, by the secretary of the American Medical Editors' Association, to address its meeting in Chicago during the session of the College of Surgeons.

In addition to the Medical Editors' Conference, an invitation was received, during the year, from the Obstetrical Section of the Oklahoma State Medical Association, and the subject of maternal welfare was presented to the largest meeting the section had ever held.

A much appreciated invitation, through the courtesy of Dr. Skeel, was given to address the Obstetrical and Gynecological Section of the Cleveland Academy of Medicine in behalf of our committee. Acceptance from invitations to the Missouri State Medical Society, and to the District Medical Society at Higginsville also gave opportunity to urge prenatal care and aseptic midwifery.

The American Child Health Association, which is to meet October 21, 1924, under supervision of George E. Vincent of the Rockefeller Foundation and of which Hon. Herbert Hoover is president, has invited the chairman to make the address on maternity at a symposium covering welfare work of the year.

Abstracts of the 1923 report and favorable mention have appeared in a number of medical journals during the year.

Our own committee has also continued with the questionnaire which brought such valuable responses for the 1923 report, as to the causes of our high morbidity and mortality and the most potent means of controlling the menace. We acknowledge with deep appreciation the contributions made to us in the many letters we have received. The causes have been summarized to a large extent in De Lee's statements.

"1. Lack of prenatal care.

"2. Lack of aseptic practice and conscience in a large number of physicians.

"3. Too much interference with the normal labor processes by men that do not know how.

"4. Unnecessary cesarean section, especially universally performed cesarean section.

"5. Undue exaltation of the child's life over that of the mother.

"6. The rapid growth of maternity wards in general hospitals, indeed the general mixing of maternity patients with surgical and medical cases has contributed enormously to the spread of puerperal infection."



7. To this category the committee desires to add the indiscreet and indiscriminate use of pituitrin regardless of indication. To one who has not observed the popularity of this obstetric vice its increase would be not only astonishing but appalling.

In a letter written May 4, 1924, Dr. J. Whitridge Williams says: "In approaching the causes of maternal mortality, they are fourfold. (1) Infection; (2) toxemia; (3) hemorrhage, and (4) dystocia.

"Of course it all means bad obstetrics, though it must be confessed that to show how better obstetrics brings about better results is a difficult task. Particularly is this the case in the large clinics where efficient prenatal work and treatment at time of labor is practiced, but the material is burdened by the large number of patients who are sent into the institutions after trouble has already occurred in the hands of incompetent or ignorant people. Possibly a number of first-rate institutions could unite in developing a set of expurgated statistics, that is, results obtained in so many thousand women who have received prenatal care and trained attention at the time of delivery and then comparing these figures with the gross statistics afforded by the health officers of the various states. This would be a huge task and would require special funds to pay for trained persons to collect the statistics."

Wm. Clark Danforth of Evanston, one of our joint committee, under date of September 5, 1924, thus expresses his views of morbidity and mortality and the means of decreasing them. "If the entire medical profession could be made thoroughly alive to a few fundamental obstetric principles, conditions would be at once materially improved."

1. Our joint committee should succeed through the county medical societies or in other ways, in getting into the minds of all physicians a realization of the essentiality of about four simple procedures in prenatal observation; complete physical examination; pelvimetry routine; analysis of urine and blood pressure. All of these are, in the hands of the vast majority of doctors, either slighted or entirely neglected.

2. We must inculcate some teaching of simple ordinary asepsis. Even in large centers of population many men who know better have got into bad habits and many others have rudimentary ideas of the necessity of asepsis.

3. An intelligent conservatism is to be emphasized to offset the growing fashion of all forms of operative interference. Many of these are going to be practiced by untrained men to the great danger of their patients.

There is only one answer to the question as to the remedy for these causes and that is summarized in the word education. The work of the committee this year as already set forth has been largely concerned with the education of the men already in practice, and has been directed largely toward inculcating the ideas of the imperative need of elementary prenatal care, aseptic attention at the time of delivery and a conscientious postpuerperal attention to the patient until she has entirely recovered.

But this education must start further back and the profession must be taught the nature of obstetrics.

Gradually the understanding that childbirth is no longer a normal function is increasing, although it is not a new theory. We are indebted to DeLee for the privilege of making the following quotations from the advance proofs of the new edition of his textbook in obstetrics.

"We may go back a hundred years and find Mauriceau proclaiming that women only escape being sick once a month by having a sickness which lasts nine months. Sir James T. Simpson said parturition is always physiological in its object, but not in some of its phenomena and peculiarities which attend it in civilized life.

"Engelmann said a simple normal labor is no longer possible.

"Henry Schwarz says that tradition and ignorance are combined in spreading the fable that childbearing is a physiological process.

"John F. Moran in 1915 appealed for a nation-wide propaganda to teach the laity that the long cherished fallacy that pregnancy and labor are physiological conditions should be abandoned.

"J. Whitridge Williams in 1923 said that 50 per cent of all pregnant women show some effect of toxemia which he classifies as pathological, and Sellheim, in 1923, avers that the demands of modern life upon woman are such that she has reached the limit of her power to meet the strain of pregnancy."

Dr. J. E. Cooper of Battle Creek, Michigan, writes the committee, among other suggestive conclusions—"Both patient and physician must be educated to the fact that obstetrics is actually a surgical condition. An education of this sort must be carried out in a semipublic manner."

He refers to the work of the Michigan State Board of Health who send out letters of instructions to women, of whose pregnancy they learn, telling what to expect of their physicians. While Cooper does not find himself quite in harmony with this method of education he feels it has done a great deal of good and that mortality will be reduced by this method. That we must anticipate the methods of the practicing physician in the education of the medical student is indisputable.

The replies to the question as to the weak points in the teaching in our medical schools, left no doubt as to the conviction on the part of many that the presentation of this subject in the curriculum is too limited in its scope and too much subordinated to other branches.

In a most interesting letter Frank W. Lynch, a member of the joint committee and a teacher of recognized ability in the University of California, writes that in his opinion the greatest fault in the teaching of obstetrics today is the lack of sufficient clinical drill in practical delivery and follow-up of patients under first class instructors. Lynch sets seventy-five cases as a maximum of experience which should be demanded before the neophyte is permitted to go into the practice of the art of obstetrics.

In quoting more at length from the valuable observations of Lynch, an interesting viewpoint is presented.—"The chief cause of maternal mortality is that doctors do not like to wait. There exists a desire to substitute surgery for normal processes. The world is in a hurry. For this reason classic indications for interference no longer hold.

"In California, after a day or two of waiting cesarean section is a common occurrence; nor is the death of the child considered a contraindication for a laparotomy!

"This feeling has developed because all too few doctors have had any apprenticeship in obstetrics. They have taught themselves their own system. The ordinary student does not see enough obstetrics to impress proper procedure upon him. Constantly, fifth year students working as internes throughout the country, tell of methods which they were taught to consider dangerous but which they find have been done by others before their day without mortality.

"In consequence they are impressed with this type of a demonstration rather than with all the didactic work in the medical school which they have already forgotten.

"The stabilizing effect of properly conducted maternity hospitals has not been sufficiently emphasized in reports of our committees. I feel that there is much bad obstetrics simply because men teach themselves."

Lynch's conclusions have the same familiar ring as those of Franklin Newell and Edward P. Davis and others whom the Committee quoted in our 1923 report.

"This situation will not improve until obstetrics assumes a more important place in our medical curriculum. No matter what the student thinks he will do after graduation he attends obstetric cases anyhow. His first experience is usually obtained from his own practice, since few see enough cases before graduation to make much impression on them. I feel that pressure should be brought to bear on all medical schools to compel them to give students at least seventy-five cases of labor before graduation. This will at least give the young graduate an opportunity to learn something of normal labor before turning him loose on the community."

A singular coincidence in the critical analysis of the causes of morbidity and mortality is the identical conclusion of Robert L. De Normandie of Harvard Medical School, a member of the joint committee on welfare with that of Lynch of San Francisco, each of them affirming that lack of conscience on the part of those doing the bulk of obstetrics is to blame. "Men do something which they know is wrong and radical and the patient survives. Then such practice is continued until serious results ultimately follow.

"Then, the public at large is not educated up to the importance of good obstetric care. Good care brings the economic factor of better fees and as the average man's services are worth about what he receives in his fee, we all know what that is.

"Present day life is a tremendous hustle. This tends to more operative work than is necessary. It is done by men with absolutely no operative obstetric training. These men who leave our school with thorough theoretical training leave with absolutely no training in operative obstetrics, yet they go out and attempt anything that comes up in practice, hesitating to call consultation, feeling that to the family that would be evidence of weakness which is not to be admitted until too late."

The advantage of hospitalization in obstetrics is more and more being emphasized. Eno claims that there is a maternal morbidity of 8 per cent in house cases and but 2 per cent in those in the hospital. Morbidity of primipara is four times that of multipara. Long labor, frequent vaginal examinations show a marked increase in morbidity, variously estimated at 33 to 75 per cent. As contributing causes the following are to be considered.

1. Interference by intrauterine douche.
2. Delivery by version and extraction.
3. Craniotomy.
4. Manual delivery of placenta.
5. Cesarean section.
6. High forceps and mid forceps.
7. Bag induction.

It is to be borne in mind that house deliveries are said to be four times the risk of hospital cases, and primipara four times the risk of multipara. Consequently, the safeguarding of primipara in particular is enormously increased by hospitalization.

It is felt that we are justified in reinforcing our report by this argument for better obstetrics, since, with a clientele whose situation is handicapped by such appalling risk why should the profession not approach the task of its aid to maternity with not only clean hands but clear heads and with a training which such a high calling demands?

Then, what are the facts? Obstetrics has from the beginning of medical practice been undertaken with an apology. Of the men who do a large part of the practice

of midwifery it is certain we may say it is as a sort of makeshift. It is only done to accommodate their friends who urge them to look after them. Or, it is accepted simply as a stepping-stone to family practice. Internists who are interested in the pathology of pregnancy, ally themselves with young surgeons whose idea of obstetric care is an abdominal section and even today there survives the anachronism of the ignorant midwife. However much maligned, her statistics are not marred by meddlesomeness.

In the magazine *Hygeia* for September, 1924, W. S. Rankin, Chief Health Officer of North Carolina, makes this startling statement: "Seven hundred fifty thousand women are annually delivered in the United States by midwives, especially in the rural districts and among the poor of the mountain regions of the South; one-third of the two and a half million mothers of this country. They are a necessity since there are not enough doctors living in these sparsely settled communities to care for these maternity cases." A million and a half more women are without prenatal care, Rankin claims, and to this fact he attributes a great share of the morbidity and mortality of childbirth. He pleads again for education of doctors, nurses, midwives, and prospective mothers, but asserts the midwife has a hold on ignorant people which has become a state of mind and cannot be changed in a generation.

The committee wishes to call special attention to an intensive survey which has been undertaken during the last ten years in Mansfield, Richland County, Ohio. This demonstration has been the means of working out the elements of a practical plan of fundamental features of health work, including prenatal and obstetric care.

There are included divisions of health, supervision of babies and pre-school children and school health.

A remarkable impression has been made on the community mind and conscience. The director of the demonstration has been officially recognized by both city and county authorities and is now general health officer. Mansfield physicians and those of the county, of their own accord and in conjunction with the director have formed postgraduate courses in obstetrics and pediatrics.

A thorough plan of health work in the schools is being consummated both by city and county. All nursing work in the city has been consolidated with increased community support of a financial nature. After five national demonstrations held in widely separated regions there are now proceeding combinations of national agencies and local communities more or less after the Mansfield venture.

The practical results of these phases of welfare must help to stimulate similar endeavors in contiguous communities. This is the sort of work that the regional consultants in Ohio and New York have been developing and which this year the State Board of Health of Missouri has also started to organize.

In the *Child Health Magazine* for July, 1924, among other very interesting reports is that of the maternal mortality rate in Minnesota which is now fifty-one per 10,000 live births. While this is a remarkably low rate for the United States, which still holds the record for the highest maternal mortality of any of the principal countries of the world, Minnesota's record of fifty-one is higher than that of fifteen countries. The article concludes with the pertinent thought that always arises in these discussions—since 75 per cent of all these deaths are preventable, such a death rate certainly properly calls forth a horrible criticism of the management of labor.

Rudolph Holmes, in an address before the Association for the Study and Prevention of Infant Mortality, deprecates the movement for continuing any form of midwife assistance as an anachronism. He believes in the prenatal clinic; a maternity hospital covering with various divisions, all the needs of the prospective

mother and her child, both before and after its advent into the world. His ideas of the hospital and home care are identical with those of our maternity center. Primipara are to be delivered at the hospital as well as all pathologic cases. Multipara, with runabout children as an added problem, are to be cared for at home by young enthusiastic practitioners who should receive some stipend for their services and who should call for help on the parent institution as may be required. All such cases should be reported back to the hospital staff, and all records should be discussed in the staff meeting and the personnel of this body should be imbued with the responsibility of its task. It should comprise men with an obstetric conscience.

One of the serious difficulties which the committee has encountered is the lack of uniformity in systems of making reports in various communities. When the operation of the Birth Registration Area becomes universal, this particular defect will be at once remedied. For instance, in some cities stillbirths are not included in the total births, but of course are a part of the mortality. This has been one feature of the high rate under which Kansas City has long suffered. Naturally, the birth rate must be estimated from the total number, if the figures have any value. Then, there is a discrepancy as to what constitutes a stillbirth; as to where the line is to be drawn between a nonreportable abortion and the birth of a stillborn infant. Our future program includes an attempt to rectify this discrepancy.

There is a difference also in computing statistics as to mortality. In some states, the mortality rate is based on the number of deaths among 10,000 live and stillbirths. In other tables the computation is made from the total female population between the ages of fifteen and forty-five.

The committee believes also that the *International List of Titles of Causes of Death* should be used in all calculations so that uniform and accurate conclusions may be reached.

Of course, it is not necessary to say, before this body, that what this committee has in contemplation is in the nature of a popular revolution of ideas. Our program is, therefore, subject to difficulties proportionate to its scope and vision. Many minds must be reached and convinced. Time and persistence are needed to effect these widespread and iconoclastic results. Many of the statements made in this report have been repeated; its arguments duplicated until they sound trite and worn to our ears. But they must be repeated and duplicated oftener and increasingly. In propaganda and education the committee puts its faith. We cannot afford to tire of the subject because it has been discussed before. The work and effort will be justified.

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# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

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### Massive Excision of Subcutaneous Abdominal Fat—An Analytical Review of the Literature and a Report of Eleven Personal Cases

BY AIMÉ PAUL HEINECK, M.D., CHICAGO, ILL.

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THE profession is not sufficiently acquainted with the benefits, cosmetic and physical, that can be secured by the operative removal of large masses of subcutaneous abdominal fat. Fatty pendulous abdominal walls have been looked upon as natural, as irremediable and therefore have received but very little study. It has, however, been repeatedly and amply demonstrated that superfluous masses of subcutaneous abdominal fat can, with safety and with advantage to the patient, be removed by operation.

Fat in excess may be deposited either in the subcutaneous cellular tissue or in the muscular and fascial layers of the abdominal wall, or may be indifferently distributed in all the tissues intervening between the skin and peritoneum. The abdominal wall may contain a layer of fat from three to four and one-half inches thick,<sup>1, 4, 5, 20</sup> even six inches thick.<sup>25</sup> Jolly classifies abdominal fat accumulations as follows:

- (a) The pendulous abdomen presenting changes in the muscular and fascial tissues of the abdominal wall.
- (b) Subcutaneous fat accumulations not associated with much weakening or impairment of the abdominal wall.
- (c) The combination of (a) and (b).

The essential anatomic characteristic of the morbid entity herein discussed is the pathologic accumulation of fat in the subcutaneous cellular tissue of the abdominal wall. In all these cases the abdomen shows a symmetric, at times an enormous<sup>9</sup> increase in volume. The fat excess is present mainly in the lower, anterior and lateral infra-umbilical portions of the abdominal wall. This superfluous local fat deposit is usually, though not always, a part of general obesity.<sup>9, 13</sup> "All these patients were enormously fat."<sup>17</sup> "Patient on admission to hospital weighed 464 pounds. When on her feet, the abdomen hung down to her knees."<sup>16</sup> It may or may not coexist with other, related or nonrelated, pathologic changes in the abdominal cavity, contents or walls.

As many cases are reported with but few details, attempts to secure adequate and accurate data meet with difficulties. A diligent search of the English, French and German literature\* yielded seventy-seven

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\*All the publications to be found at the John Crerar Library, Chicago, Ill.

operatively treated cases serviceable for analytical study. To these we have added eleven personal cases. We did not use the cases of Babcock, forty cases,<sup>1</sup> of Lathrop, one hundred and three cases<sup>14</sup> and others that are too briefly reported.

All the patients were adults. In many cases the exact age is not reported. The youngest, at time of operation, was twenty-five years old;<sup>27</sup> the oldest were fifty-six,<sup>21</sup> fifty-seven<sup>18</sup> and fifty-nine years (personal case). In the other cases, the age is stated as follows:

Years	Cases
26 to 35	9
36 to 45	18
46 to 55	22

Excessive localization of fat in the abdominal wall is infrequent in men. In our series, there were six males<sup>7, 14, 23, 27</sup> and two personal cases and eighty-two females. Flabby and sagging abdominal walls overloaded with fat are met commonly in individuals who since early life have been corpulent; the most pronounced forms, however, are seen in multiparae. Thirty-three cases occurring in multiparae, eleven-parae one case,<sup>21</sup> ten-parae one case,<sup>12</sup> etc. It also occurs in nulliparae.<sup>9, 10, 16, 25, 26</sup>

Lack of space does not permit the discussion of the many complicating conditions that aggravate the discomfort and disability provoked by pendulous abdominal walls.

Redundant fatty abdominal walls, if uncomplicated, give few symptoms. These symptoms, however, both subjective and objective, are characteristic and conclusive. All the objective symptoms are demonstrable either to inspection or by palpation. At first, pain and disability are slight; the condition progressing, they and the other associated symptoms increase in severity. "Not much pain at first; the swelling of the abdomen gradually increased as did also the shortness of breath and the great pain in the abdomen, in front as well as in the back."<sup>4</sup>

Pain is influenced by posture and is more marked with the patient in the erect posture. The pain is increased by all forms of exercise. It is lessened and in some cases disappears with rest in the recumbent posture. It often has the nature of a painful, dragging sensation, and is lumbar, inguinal and hypogastric in location. These patients are inactive;<sup>28</sup> they become averse to all effort, there results a vicious circle, for the increased inactivity leads to increase of the local and general adiposity. In women who near the menopause take on adipose, there not uncommonly forms a huge, pendulous roll of fat across the lower abdomen, below the umbilicus. This pendant fat-mass creates a crease, often madid and eczematous, located just above the symphysis pubis.<sup>13</sup> In most patients, the continuous contact and friction of the inferior cutaneous surface of this fat apron and the underlying regions determine an erythema, an eczema, an excoriation, an elephantiasis<sup>9</sup> of the skin of lower abdomen, of the inguinal folds and in some cases of the upper part of the thighs. Some patients present two distinct creases. All the subcutaneous tissues of the hypogastric and iliac regions take part in the formation of these folds

which extend transversely from one lumbo-iliac region to the other and which vary in length and thickness. In the recumbent posture, the flabby, fatty mass gravitates to either side and sags over the iliac spines and crests.<sup>25</sup> The prolapsed tissues show impaired tonicity and resistance. Nearly all the patients are obese: two hundred twenty-seven pounds,<sup>24</sup> two hundred forty pounds,<sup>4</sup> two hundred eighty-five pounds,<sup>13</sup> three hundred fifteen pounds (Gibbon-14), etc.

This excessive fat-deposit hangs apron-like over the external genitalia and the upper portion of the thighs<sup>12</sup> and may overlap the upper two-thirds of the thighs.<sup>28</sup> "In the standing position, the abdomen hung down in a fold which extended to within two inches of the patella."<sup>25</sup> "The abdominal wall reached below the knees when the patient was standing."<sup>14</sup>

Other subjective symptoms and objective signs are enumerated in conjunction with indications for operation.

Pendulous fatty abdomen must be differentiated from diastasis of the recti abdominis, with which it may be associated. If it be suspected that the recti abdominis are abnormally separated, the examination is best conducted with the patient in the recumbent posture. The patient reclining, is told to elevate the head as high as possible without the help of the arms. If the diagnosis be positive, this maneuver separates the inner borders of the two recti muscles from one another, causes a greater or lesser prolapse of the intestines through the gap and enables the examining hand to easily depress the superficial abdominal coverings into the abdominal cavity.

The careful clinician will not overlook or misdiagnose hernias (umbilical, inguinal, ventral, etc.) They frequently coexist with pendulous abdomen. Their anatomic location and clinical characteristics are suggestive. Hernias give an impulse on coughing; often present a volume larger at times than at others; if intestinal, they give a tympanitic note on percussion. If no hernia be present, if there be no abnormal separation of the recti muscles, the fat-mass can be easily raised from, and made to glide somewhat upon the underlying resistant muscular wall.

In properly selected cases, large masses of fat can be removed from flabby, sagging, fatty abdominal walls when the excessive fat deposit—

1. Causes great annoyance and discomfort;

- (a) Pain.<sup>11, 16</sup>
- (b) Backache.<sup>24</sup>
- (c) Dyspnea on moderate exertion—ascending stairs, walking, bending.<sup>27</sup>
- (d) Distressing irritation,<sup>3</sup> inflammation of the skin, erythema,<sup>7</sup> intertrigo,<sup>22</sup> eczema,<sup>14</sup> chronic inguinal excoriation.<sup>15</sup>
- (e) Pouch-like overhanging of a cumbersome, useless, fatty apron in front of the upper portion of the thighs.<sup>6, 9, 12</sup>
- (f) Undue fatigue<sup>21</sup> and painful dragging sensation from the weight of the mass.<sup>19</sup>

2. Determines manifest disability;

- (a) Interference with locomotion.<sup>27</sup>
- (b) Interference with marital relations.<sup>7</sup>



- (c) Interference with the exercise of one's calling.<sup>9</sup> "Patient said that she was becoming a semiinvalid and insisted that she be relieved."<sup>6</sup>

3. Constitutes a physical handicap;<sup>13</sup>

- (a) Inability to comfortably and gracefully assume the erect posture; waddling gait.<sup>13</sup>  
 (b) Inability to attend to the toilet of the lower part of the body.<sup>13, 22, 28</sup>

4. Becomes an unbearable social handicap; patient is unwieldy, unsightly, incapacitated for recreation, not sick, not well.<sup>2, 13</sup> "The dragging sensation caused by the pendulous abdomen was so great that she was forced to keep off her feet as much as possible."<sup>6</sup>

Resection of large masses of subcutaneous abdominal fat is also justifiable and most serviceable:

1. In the obese, to lessen the tendency to hernia formation.
2. In operating for hernia in obese individuals, so as to obtain better exposure of hernial rings and hernial regions.
3. As an associated, supplementary and terminal step to many abdominal operations: hysterectomy (Marvel-20); ovariectomy;<sup>9</sup> cholecystotomy and cholecystectomy (personal cases); appendectomy;<sup>24</sup> uterine prolapse and retroflexio uteri.<sup>21</sup> "In association with lipectomy, we have frequently drained or removed the gall bladder, the appendix or have performed other abdominal or pelvic operations."<sup>11</sup>
4. As a preliminary step to many abdominal operations so as to facilitate intraabdominal work:<sup>2</sup> a small fibroid in an atrophic uterus, a retrocecal appendix, a small gall bladder tucked away in a deep fossa with a stone in the cystic duct or still worse a stone in the common duct, etc.
5. In cases in which the careful fitting and wearing of an orthopedic apparatus is not otherwise feasible. "Lipectomy was done to facilitate the fitting and wearing of an orthopedic apparatus for the support of the strained sacroiliac joints."<sup>16</sup>

The benefits secured from massive resection of superfluous subcutaneous abdominal fat are so evident, so manifest, and the dangers attending the operation are so negligible that even in the absence of any other pathologic process calling for an abdominal operation, the surgeon should not hesitate to advise and to urge the excision of these useless, troublesome and cumbersome fat accumulations.

The risks of simple lipectomy, either performed alone or in conjunction with other operative procedures, are far outweighed by its beneficent results. It has been successfully performed at the same sitting with operations for the cure of hernia (umbilical, inguinal, ventral, epigastric, incisional), appendiceal, gall bladder and uterine disease, etc. In the eighty-eight cases furnishing the subject matter of this paper, only two deaths are recorded. One patient, operated upon for umbilical hernia and pendulous abdomen, died from embolism.<sup>20</sup> MacLean's<sup>10</sup> patient, operated on for pendulous abdomen and incisional hernia, died from peritonitis on the fifth postoperative day.

Lathrop<sup>14</sup> operated one hundred and three cases of umbilical hernia. In fifty-seven of these, he removed some excess fat. In the remaining forty-six cases, he performed a regular lipectomy. He reports one death which occurred twenty-two days after operation. The patient,

a man weighing 325 pounds, from whom twenty-two pounds of fat had been removed, did well for two weeks, then his kidneys began to fail and he gradually succumbed.

In twenty-four cases of our series, a simple lipectomy was performed<sup>2, 7, 12, 13, 14, 16, 21, 22, 23, 25, 26, 27</sup> and in five personal cases. In simple lipectomy, the operative procedure is limited to the massive retrenchment of redundant subcutaneous fat and overlying skin. The incisions extend through the skin and fat, down to the fascia and not beyond.

In the remaining sixty-four cases, the lipectomy either preceded or followed, but always at the same sitting, operative steps for the cure of—

- (a) an umbilical hernia,<sup>2, 4, 5, 6, 10, 13, 14, 16, 17, 18, 21, 28, 29.</sup>
- (b) an epigastric hernia (<sup>3</sup> and one personal case);

In (a) and (b), the overlapping of flaps leads to local elevation or ridge formation. This need not disturb the surgeon; the fortifying of the abdominal wall has been accomplished.

- (c) a large ovarian cyst and umbilical hernia<sup>9</sup> (two cases and one personal case);
- (d) a ventral hernia (Gibbon-14);
- (e) an incisional hernia;<sup>15, 24</sup>
- (f) uterine disease (uterine fibroid) (Marvel-20);
- (g) uterine prolapse;<sup>21</sup>
- (h) appendicitis<sup>24</sup> and one personal case);
- (i) gall bladder disease, cholecystostomy or cholecystectomy (<sup>2</sup> and one personal case);
- (j) diastasis of the recti abdominis.<sup>15</sup>

Lipectomy has also been performed—

- (a) to facilitate intraabdominal work, by making intraabdominal organs more accessible;
- (b) to assure a better adjustment of orthopedic appliances.<sup>16</sup>

Different operative procedures are employed for the cure of the condition under consideration, each operator being partial to the method which has given him the most satisfactory results. Whatever technic be used, it is all important and it must always be adapted to the case at hand that the integrity of the abdominal muscles, fasciae and peritoneal fat be fully respected. Only the skin and fatty mass immediately subjacent to it and directly in front of the fascia are to be removed.

The operation which we perform and recommend is entirely different from that performed by Creveling and others who, to restore the abdomen to normal size and contour, carry their incisions through the entire thickness of the abdominal wall into the peritoneal cavity. Bear in mind that we are not considering here prolapsus of all the abdominal coverings. We are only discussing the removal of excessive subcutaneous fat accumulations.

In the reported cases the amount of fat removed varies; and here it is well to note that many operators state with emphasis that they could, with much additional benefit to the patient, have removed more fat than they actually did. The completeness of the fat removal is a

measure of the freedom from fat thereafter of the part operated. Enough fat should be removed to completely eliminate soreness from chafing. It has been our practice to remove the mass in one or two pieces. Concerning the quantity of excised fat, different clinicians express themselves as follows: "Several pounds of fat and skin."<sup>4</sup> "From one-half to fourteen pounds."<sup>1</sup> "The mass was so long that as I held one end up high in my hands at breast level, the other end dragged on the floor and it was so heavy that it was difficult to keep my hold."<sup>13</sup> "The specimen removed was one yard and three inches long, one and one-half feet wide, three inches thick at the edge and weighed seventeen pounds."<sup>5</sup> "Removed a wedge of fat weighing thirty-two pounds" (Clark<sup>14</sup>). "The flap of belly-wall fat removed together with the hernial contents weighed forty pounds."<sup>10</sup>

After having performed several lipectomies, the surgeon experiences little difficulty in deciding how much fat it is judicious to remove. The removal of one large wedge-shaped fat-block, occasionally two, rarely three, usually suffices. As the patient lies in the recumbent position, the fatty mass gravitates to the sides and can be picked up, can be lifted up as a great ridge or fold lying across the abdomen. The operator grasping this mass in the center, pulls it up and away from the body and circumscribes it by two incisions, one passing a little above and the other a little below the lines of deflection.

It is preferable that the incisions be clean-cut, made with one or several long sweeps of a broad-blade scalpel or short amputation knife. The length of the incisions has little appreciable influence on the outcome of the operation. "The incisions were twenty-one inches long."<sup>17</sup> "Incision was twenty-seven inches in length; there were four hundred square inches of raw surface."<sup>15</sup> "After being sutured, the incision measured twenty-two inches in length from flank to flank."<sup>14</sup> "When stitches were removed, the abdominal incision had contracted until it measured only twenty-seven inches from side to side."<sup>16</sup> Patterning by slicing is bad practice. Small hacking cuts are to be condemned. The smoother the fat surface, the better the approximation. Two initial incisions usually fulfil all requirements. These two incisions converge into one upon the fascial layer, thus no undermined surfaces, no pouches for the accumulation of wound secretions are left. Sufficient skin must be left for approximation. There must be no undermining of the wound edges.

In the reported cases, dissimilar incisions differing in type, in length, and in location, were employed. Most operators used two transverse elliptical incisions joined at both ends,<sup>5, 6, 10, 14, 16, 17</sup> etc. In some cases, the upper incision was supra-umbilical; in most cases, both incisions were made below the umbilicus. The incisions, starting at either the anterior, or middle or posterior axillary line of one side cross the abdomen and terminate at a corresponding point on the opposite side. Castle<sup>5</sup> began his upper incision two inches lateral to the spinous process of the lumbar vertebra and carried it above the umbilicus, across the abdomen, to an analogous point on the opposite side. The ends of this incision were joined by a second transverse incision crossing the abdominal wall above the pubes. These two incisions outlined an ellipse. Cullen<sup>6</sup> circumscribed a large transverse elliptical area which, after removal, measured thirty-six inches from side to side and nineteen inches from above downward. Shallenberger<sup>24</sup> by means

of a double infra-umbilical incision going from flank to flank, embraced an elliptoid area of skin 45 cm. long and 15 cm. at its widest part.

In selecting incisions, we are guided as to length, type and location by various factors such as, the existence or absence of complicating conditions, the nature of the other indicated operative steps, the amount of fat to be removed, the patient's general condition, etc. For the excision of large wedge-shaped fat-blocks, we have adopted and recommend two transverse elliptical incisions, beginning well over on one side and extending to corresponding points on the opposite side. These two incisions converge toward the fascial layer. Many other operators follow the same practice. If an abdominal section is to be performed at the same sitting, the fat is first removed by means of a double transverse incision. This having been done, one proceeds to enter the abdominal cavity by a vertical incision through the rest of the abdominal wall. Bullitt<sup>4</sup> completed his operation for umbilical hernia, then prolonged, in both directions and to both flanks, the horizontal incision which he had made. A second transverse incision joining the ends of the first incision was then made; at its midpoint, it was about seven inches below the first.

Transverse incisions have the disadvantage of increasing the already large waist measure and of leaving at each end of the wound an unsightly projection. To avoid these, Babcock<sup>1</sup> removed a small vertical ellipse of skin near each end of the transverse incisions. If transverse incisions be used, the approximation and the apposition of the flaps is effected more easily, the liability to postoperative separation of the wound-edges is minimal, primary union<sup>4, 9, 10, 20, 22, 28</sup> is frequent, delayed healing is rare<sup>16</sup> and long-delayed cicatrization is very uncommon.

Longitudinal incisions found favor with few clinicians. Frist<sup>9</sup> made two longitudinal incisions, 70 cm. in length, outlining an ellipse that extended from about a hand's breadth below the xiphoid cartilage to a hand's breadth above the symphysis. At their point of maximal separation from each other, each of these two incisions was fourteen cm. external to the corresponding mamillary line. The wound edges having separated in a few places, healing was delayed. Spaulding<sup>25</sup> made an elliptical incision on each side of the median line. Each incision extended from just below the breast to the center of Poupart's ligament. He removed the integument and fat six inches thick down to the sheath of the abdominal muscles.

In some cases, we made two elliptical vertical incisions at each end of the transverse incisions and were thereby enabled to remove two additional wedge-shaped fat-blocks. Babcock<sup>1</sup> recommends removal of a vertical ellipse of skin and a vertical line of closure. He alters the shape of the ellipse so as to best contour the waist and upper pelvis. In order to remove a large amount of subcutaneous fat, he widely undercuts the skin. This practice is avoided and condemned by most operators. Schepelmann<sup>21</sup> uses a "lyraform" incision. I have had no experience with it.

Though multiple incisions, patterning by slicing, hacking cuts, undermining of wound-edges, excision of vertical fat-blocks are not conducive to the most esthetic and satisfactory results, they have been practiced by some. For instance, Ballard removed fat and skin from above downward as well as from side to side. To quote his own words: "I removed an elliptiform piece of tissue down to the fascia extending

from within three inches of the symphysis pubis and eight inches at its greatest width. I then removed two large v-shaped strips transversely from about the center of the perpendicular incisions."

Fat is a tissue of low vitality and special care must be taken that there be little or no accumulation of serous or serosanguineous fluid between or beneath the flaps. Retained wound secretions retard healing, invite infection. A drain is inserted at either end of the wound; if the wound be long, a drain may also be inserted at its center. Closure is effected by approximation sutures of silkworm-gut. For the exact apposition of the wound edges, we use linen. In these cases, I frequently advise the application of hot boric acid compresses to the operative wound for from two to three days; these fomentations are to be renewed every four hours. The drains are removed as soon as the discharge warrants it and the patient is kept in bed for about fifteen days. The result of the closure should be a smooth abdomen with a linear scar,<sup>13, 27</sup> and without any hanging folds<sup>19</sup>—"the pendulous appearance being entirely removed and replaced by a simple large pronounced ridge."<sup>24</sup> Some patients during the first few post-operative days complain of abdominal tightness, of abdominal constriction.<sup>18</sup> It calls for no special treatment.

#### PERSONAL CASES

CASE 1.—Female; forty-six years old; 5-para; weight 265 pounds. Complained of dyspnea on exertion, was apathetic and tired easily. There was great disinclination for all forms of exercise. Palpation outlined with difficulty a mass in abdominal cavity; it proved to be a left multilocular ovarian cyst. Operation: Ovariectomy and excision of a wedge-shaped mass of fat and skin weighing thirty pounds. Cyst weighed 9.90 pounds. Patient left hospital at the end of fourth week with wound completely healed. Postoperative treatment: Dietetic. Patient was seen five years later. Shortness of breath had completely disappeared and she was able to do all her own housework.

CASE 2.—Female; fifty-two years old; tertipara; three abortions; menopause at 43 years; weight 240 pounds. In the dorsal position, the pendulous abdomen was on the level with the perineum; in the erect position, it was a couple of inches lower down. There was a very distressing irritation of the skin in the crease made by the transverse abdominal fold. Operation: I excised a mass of fat and skin weighing eighteen pounds. For a few days, fatty serum escaped from both angles of the wound. Patient was seen three years after operation. She expressed great satisfaction as to the cosmetic and physical improvement.

CASE 3.—Female; forty-nine years old; two-para; weight 240 pounds. For last four years, had noticed a small but painful epigastric swelling in the median line. Condition was misdiagnosed and treated for dyspepsia. Since birth of her last child, there had been a gradual increase in size of the abdomen and an increase in body-weight. Patient had a waddling gait and was unable to give lower part of her body the proper care. Patient's condition had unfavorably influenced her home life. Operation: radical cure for hernia and removal of a mass of fat and skin weighing nineteen pounds. Uneventful recovery. She was seen six years after operation. Fatty accumulation and hernia had not recurred.

CASE 4.—Male; forty-four years old; ex-saloonman and office holder; weight 320 pounds. Patient suffered from general obesity and was much handicapped by his physical infirmity. He was subjected to dietetic and medicinal measures for

two months and, during that time, reduced eighteen pounds. Patient begged for operative relief. A mass of fat and skin weighing thirty pounds was removed. He was kept under observation for two months after leaving hospital and lost an additional sixteen pounds. When seen two years later, improvement had maintained itself. It must be stated that patient has since been very careful as to his diet.

CASE 5.—Female; forty-seven years old; four-para; weight 275 pounds. Has had several attacks of acute appendicitis. For last six months more or less constant pain in the appendiceal region. Suffered from the inconvenience and discomfort incident to a fatty, pendulous abdominal wall which, in the erect posture, hung down in a fold which extended to within three inches of the patella. Operation: Removal of a chronically inflamed appendix bound down by adhesions and retrenchment of a mass of fat and skin weighing twenty-eight pounds. Patient was seen eight years after operation and is in good health. She does all her own housework, has no digestive disturbances, and there has been no increase in weight.

CASE 6.—Female; forty-eight years old; six children; weight 290 pounds. Menopause at forty years. Applied for relief from fatty abdominal wall which she said was cumbersome, unsightly, painful, making walking and her household duties difficult and very fatiguing. Excision from the abdominal wall of a slab of fat and skin weighing twenty-nine and one-half pounds. During the first few days after operation patient suffered from pulmonary congestion; otherwise recovery was normal. Discharge of a serous fatty fluid from both angles of wound. Patient left hospital at end of four weeks. Wound was completely healed. She was seen four years later and was well pleased with the results obtained.

CASE 7.—Female; forty-six years old; nullipara. Menopause at forty-one years. Mass in lower right abdominal quadrant. Weight 275 pounds. Laparotomy: removed an ovarian cyst the size of a child's head; also excision of twenty-two pounds of subcutaneous fat and skin. Recovery—left hospital on twenty-second day.

CASE 8.—Male; fifty-three years old. Boss-baker. Hearty eater; heavy drinker. Weight was 315 pounds. During the last few years has had several attacks of biliary colic. Tenderness in right hypochondriac region. Cholecystectomy was done and tubular drainage through right lumbar region for five days. I also removed thirty-five pounds of skin and fat—healing by first intention with exception of two stitch abscesses and collection of clear serum in the region of the left angle of the wound which we squeezed out; otherwise recovery was uneventful. He reported six years later. The pendulous appearance of the abdomen was no longer existent, being replaced by a single transverse abdominal linear cicatrix.

CASE 9.—Female; fifty-two years old; six-para. Menopause at forty-one years. Weight was 265 pounds. Had been treated for last eight years for dyspepsia. Complained much of eczematous condition of skin beneath transverse abdominal fold. I removed a 30-pound slab of fat and skin before opening abdominal cavity. I had intended to do a cholecystectomy. After exposure of the gall bladder, as the patient was taking the anesthetic poorly, I became alarmed and did a cholecystostomy. I removed over four hundred small biliary calculi. Patient left hospital on the twenty-eighth postoperative day. Biliary fistula was still discharging and closed in about a month.

CASE 10.—Female; forty-six years old; nullipara; weight 250 pounds. It was a case of general obesity with pendulous abdomen overhanging upper third of thighs. Patient was much annoyed by her corpulency which abdominal binders and corsets could not conceal and had failed to relieve. Physical condition was good. I re-

moved a mass of fat and skin weighing twenty-eight pounds. Patient complained of distressing tightness in the abdomen which completely disappeared in a few days.

CASE 11.—Female cook; forty-nine years old; nullipara; weight 272 pounds; menopause at forty-two years. Pendulous fatty abdomen was such a physical handicap that patient had to abandon her position. She was mentally depressed by her infirmity. I removed thirty-seven pounds of skin and fat. Patient was seen three months after operation. She was happy and back at work.

#### SUMMARY

In suitably selected cases, the operative removal from the abdominal wall of large wedge-shaped masses of subcutaneous fat has the following advantages:

1. It is a safe and invariably beneficial surgical procedure. It has always been performed under general surgical anesthesia; never under local or spinal anesthesia.
2. It is always devoid of immediate or remote dangers to the patient; though the wound be extensive, the hemorrhage is moderate and healing is good.
3. It is simple of execution, and, if unassociated with another operative procedure, the technic is easy and the performance of the operation does not consume much time. It is all important that the incisions be carried to but not beyond the fascia.
4. It may be the only operation indicated and performed in the case at hand.
5. It is, at times, called for as a preliminary operative step to facilitate intraabdominal work and to give better access to intraabdominal organs.
6. It is not infrequently employed in conjunction with other operations. The operator retrenches an unwieldy, useless, pendent mass of subcutaneous abdominal fat and at the same sitting brings relief to, or corrects, coexisting pathologic abdominal conditions.
7. It eliminates a physical handicap, effects a marked improvement in the patient's appearance and general well-being and procures complete relief from an unsightly, painful and disabling deformity.<sup>23</sup>
8. It gives permanent results,<sup>17</sup> if postoperative instructions regarding diet and exercise are followed. Adipose tissue, when excised, never fully regenerates.
9. It secures the following benefits:
  - (a) Diminution in weight. "At time of patient's departure from the hospital, she weighed seventy-five pounds less than at time of entrance."<sup>15</sup> "On discharge, the loss in weight was about ninety-three pounds."<sup>19</sup>
  - (b) Freedom from discomfort, local and general, and from the disability incident to cumbersome, burdensome, pendulous fatty abdomen.<sup>12, 22</sup>
  - (c) Improvement in the patient's general appearance, the hippopotomic abdominal wall being converted into a straight front. Improvement in pose; body is no longer awkwardly balanced and gait ceased to be waddling. Patient is enabled to resume his or her occupation.
  - (d) Patient, after its performance, can occupy a more normal, more natural and more useful relation to society.

(c) The patient can be more active, can give better personal attention to the body, can give his or her work the necessary attention and necessary application.<sup>7</sup>

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## Selected Abstracts

### Congenital Malformations

**Polano: True Hermaphroditism in the Human Being.** Zeitschrift für Geburtshilfe und Gynäkologie, 1920, lxxxiii, 114.

Polano gives a very detailed clinical and pathologic description of a case of this very rare anomaly. The patient, a tailor of twenty-two years, considered himself a male but showed feminine secondary sexual characteristics in mental attributes, voice, hair distribution, bony skeleton and well developed mammae. At the age of three he had undergone a series of plastic operations for what was considered a third degree hypospadias. Patient's habits of life were masculine but he showed no sexual inclinations toward either sex. At twenty, regular and painless but scanty monthly bleeding appeared from the urethra. Patient appeared for operation because of an abdominal tumor which proved to be malignant, arising from the right ovary, of the type of an epithelioma chorioectodermale. There was a small but well developed uterus, normal left tube and parovarium. The left ovary showed small cystic degeneration, with primordial follicles and corpora albicantia, with theca lutein cells. In its center was testicular tissue with Sertoli's cells but without evidence of spermatogenesis. There was also a circumscribed metastasis from the tumor of the other side. The right tube was atretic, and only isthmie portion well developed; wolffian body remained in mesosalpinx abnormally well developed, giving picture of the vas deferens. The vagina opened into the operatively constructed urethra, just behind the hypertrophied penis-like clitoris. The author gives a critical review of the literature consisting of three authentic cases in men and seven in animals.

MARGARET SCHULZE.



**Villette:** Congenital Absence of the Vagina and Formation of a Vagina by Intestinal Transplantation. *Archives Franco-Belges de Chirurgie*, 1923, xxvi, 1047.

The earliest attempts at formation of a new vagina consisted in reduplication of the perineal tissues between the bladder and rectum. Other operations attempted to remedy the condition by using the peritoneum of the culdesac. The use of vaginal mucous membrane removed from some other case such as a procidentia has also been suggested. However the results from any of these operations were not satisfactory. Villette, in reviewing the literature was able to find thirty-three cases where a loop of small intestine was used satisfactorily in the formation of a new vagina. He therefore concludes that this is the operation of choice.

An unmarried woman, twenty years of age, consulted the author because she desired to become married. General examination revealed no abnormality. Vaginal examination showed a complete absence of the vagina. Later when the abdomen was opened the ovaries were found to be normal except for a small cyst on the right ovary. The tubes also were well developed. The proximal ends of the tubes were attached on either side to a cord-like structure which was a rudimentary bicornate uterus. These cord-like structures united at their lower end to form a rudimentary cervix, and were attached firmly to the posterior surface of the bladder.

The operation was done in three steps. At the first an opening was made in the rectovaginal septum. This opening extended from the vulva to the peritoneum of the culdesac. At the second operation, the abdomen was opened and a loop of small intestine about twenty cm. in length was isolated with its v-shaped mesenteric attachment. The continuity of the small bowel was restored by a lateral anastomosis. The isolated loop was placed through the peritoneum of the culdesac into the opening made previously. The tissues of the culdesac were then closed over and the abdomen closed. Finally, the third step consisted in bringing down one end of the intestinal loop from below and suturing it to the perineal surface.

The wound healed nicely and the patient was discharged on the eighteenth day. She was seen six weeks later at which time two fingers could be introduced into the artificial vagina with ease.

THEODORE W. ADAMS.

**Hortolomei:** Four Cases of Congenital Absence of the Vagina. *Zentralblatt für Chirurgie*, 1923, 1, 259.

The four cases here reported were operated on by the Baldwin method in which the vagina is constructed from a loop of small intestine. Three operations were quite successful, the resulting vagina being permanent and satisfactory in every way. The fourth patient, however, succumbed to peritonitis.

Including these cases, there have been reported fifty-five cases operated by Baldwin's method with a mortality of twelve or 21.8 per cent. Against this there have been reported forty-eight cases operated on by the method of Schubert, who constructs the vagina from the large intestine, without a single death. Hortolomei, therefore, concludes that, while the vagina made according to Baldwin's method is somewhat more satisfactory and the method presents less technical difficulties, it should be abandoned in favor of Schubert's method on account of the high mortality resulting from the former.

R. E. WOBUS.

**Hörmann:** Construction of Vagina from Intestine in Complete Absence of Former. *Muenchener Medizinische Wochenschrift*, 1920, lxvii, 1203.

The patient, twenty-five years old, had never menstruated, but was in perfect health otherwise. Examination showed normal vulva, clitoris and urethra with a shallow depression between urethra and posterior commissure.

The operation consisted of three stages: (1) A three cm. incision between the urethra and the posterior commissure, carried through between the bladder and the rectum to the peritoneum; the latter was opened and a gauze tampon inserted. (2) Suprapubic incision. A uterus bicornis unicollis rudimentarius was found with normal ovaries and tubes. Resection was done of small intestine 12 cm. in length, freely adjustable in the transverse axis of the lesser pelvis. Both ends of resected intestine were closed with purse-string sutures. Resected piece was introduced into the artificial vagina after removal of the gauze tampon. Closure of abdominal wound. (3) Opening of the purse-string suture at the distal end of the resected intestine, silk buttonhole sutures between intestine and introitus, forcible stretching.

The wounds healed by first intention. Aftertreatment consisted in speculum dilatation of the introitus.

The patient married and had painless intercourse half a year after operation.

Examination three years after operation showed what one might expect to find in a nullipara who had undergone total extirpation of the uterus.

S. B. SOLHAUG.

**Robinson: Congenital Absence of Vagina and Uterus.** *Surgery, Gynecology and Obstetrics*, 1920, xxxi, 55.

Operative measures to create a vaginal tract should be undertaken only in individuals who are physically and psychically women in the fullest sense. In order that the newly constructed vagina should approach the normal as closely as possible it should be lined with a soft, lubricated mucosa and the employment of an intestinal loop for that purpose is the choice operation.

Details of a case operated upon by the method advocated by Baldwin are appended. Robinson, however, prefers to begin his operation from above instead of below, as advocated by Baldwin.

R. E. WOBUS.

**Rosenstein: Construction of a Vagina in Cases of Congenital Defect.** *Monatsschrift für Geburtshilfe und Gynäkologie*, 1922, lviii, 176.

Absence of the vagina is usually associated with complete or nearly complete aplasia of the internal genitalia. As an irony of fate, these women are well endowed with all the external sex characteristics and they have the normal libido. While in some cases no trace of a hymen is present, there is often a normal hymen and behind it a very small vagina about one-half to one cm. long. The two symptoms which bring these patients to the physician are amenorrhea and the inability to have sexual intercourse.

It is justifiable, according to the author, to construct a vagina for the women who are, or expect to be, married, since all their happiness may depend upon the presence of a vagina. The best methods of making a vagina are those which utilize the intestine. The small intestine is used in the Baldwin-Mori operation and the large intestine in the Schubert operation. The latter is by far the better since out of forty-seven reported cases there has not been a single fatality, while after forty-nine Baldwin operations there have been ten deaths, a mortality of 20.8 per cent. The Schubert operation is the operation of choice not only because it is not dangerous to life but also because it is extraperitoneal, simpler and can be done at one sitting.

The author reports two cases where operation proved successful using the Schubert technic.

J. P. GREENHILL.

**Wharton, Lawrence R.:** Congenital Absence of the Uterus and Associated Developmental Defects; Report of a Case. *Surgery, Gynecology and Obstetrics*, xl, 31, 1925.

The genital and urinary systems have a common origin and in their development are inseparably associated. A clinical study of a case of congenital deformity must be well considered from the viewpoint of the genitourinary system as a whole. Malformations of the uterus are occasionally associated with developmental defects of organs not in the genitourinary system. Such defects have been found most commonly in the abdominal wall, the bony pelvis, and the structures derived from the cloaca, i. e., the rectum, anus and bladder. The experimental work of Hertwig, Sabin and Stockard demonstrates that congenital defects have their incipency farther back in embryonic life than we have heretofore supposed.

WM. C. HENSKE.

**Royster:** Malformations of the Uterus: with Clinical Reports. *American Journal of Surgery*, 1922, xxxvi, 110.

The author cites three very interesting cases of malformation of the uterus, all of which came to hysterectomy. In a survey of the literature he furnishes some theoretical problems that deserve consideration.

W. KERWIN.

**Nemes:** Separated Double Uterus with Hematometra. *Wiener Klinische Wochenschrift*, 1921, xxxiv, 440.

The author reports a double uterus in which the right cervix opened into a vagina and thence to the outside, while the left one opened into a vagina three mm. wide which ran alongside the right vagina down to a point two inches above the external vaginal orifice where the left opened into the right.

The left uterus was distended with old menstrual blood to the size of a goose egg. The left tube was one-half inch thick and contained no blood. The right uterus was less developed than the left and adherent to its adnexa. There were many pelvic adhesions. A complete hysterectomy was done.

The external genitals were normal except that the introitus was placed somewhat to the right.

The patient was twenty-six years old, had menstruated normally for seven years and then had painful menstruation for one year with cramps in the left side. For the last five weeks the cramps had been continuous. It seems probable that the left vagina became atresic at the time the menstrual pain began and that the blood from the left uterus was forced through the tube into the pelvis, causing pain and the pelvic adhesions.

FRANK A. PEMBERTON.

**Schoenholz:** Congenital Tubal Anomalies. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1924, lxxxvii, 56.

The author describes cases and gives excellent illustrations which lead him to the following conclusions:

There are anomalies in the tubes of adults whose anatomic structure cannot be explained by an inflammatory process. Cytogenic tissue within the tubal mucosa, infoldings of epithelium into the tubal musculature, as well as the formation of networks by the fimbriae in which there are no histologic signs of a cured inflammation, may in many cases be explained by a disturbance in development. They are to be considered as malformations, and the theory is strengthened by the discovery of isolated examples of similar conditions in tubes of the newborn. The importance of these structures in the tubal nidation of the ovum is obvious. The inflammatory theory of the origin of salpingitis isthmica nodosa and of diverticula should, in view of these observations, be revised.

MARGARET SCHULZE.

**Krause: A Rare Double Malformation.** *Zeitschrift für Geburtshülfe und Gynäkologie*, 1924, lxxxvii, 92.

The author describes and illustrates a double monster of the type cephaloxipho-omphalopagus, which occurred as a six months' stillbirth. He discusses the etiology of the condition in considerable detail.

MARGARET SCHULZE.

**Wüsthoff, H.: The Early Diagnosis of Congenital Heart Disease.** *Monatsschrift für Geburtshülfe und Gynäkologie*, 1922, lx, 365.

All the abnormalities in the development of the heart are well tolerated during fetal life and immediately after birth. Only when the placental circulation is ended, do symptoms arise. One of the earliest is dyspnea and this is soon accompanied by cyanosis. The latter symptom may not appear for days or even weeks, or it may occur periodically when the child overexerts itself. The cyanosis is due essentially to a venous stasis, therefore insufficiency of the right side of the heart. With the slowed circulation there is sometimes a marked drop in body temperature. While auscultation in adults is most essential for a correct diagnosis, it is not so important in infants. First because there is great difficulty in localizing the various sounds heard and secondly because in many cases of fetal heart disease no murmurs are heard. Sometimes murmurs are heard only after a few days. Organic murmurs differ from functional ones in that they are loud, rough, are heard all over the cardiac area and in the back and are constant regardless of respiration or posture of the child. Single murmurs are always systolic while a diastolic one is always associated with a systolic one. Percussion is of very little value in infants. The x-ray may help by showing the size and configuration of the heart. Extracardiac symptoms are diminished response to external stimuli, drowsiness, poor nursing and absence of signs of discomfort when wet. Other maldevelopments such as hare lip, cleft palate, epispadias, etc., may help to make the diagnosis. Heredity may play a part.

J. P. GREENHILL.

## Items

### Erratum

In the issue of January, 1925, page 114, line 26, the closing remarks of Dr. Sampson should read "endometrial implants," not decidual implants.

### Boylston Medical Prizes of Harvard Medical School

A prize of five hundred dollars and the Boylston Prize Medal is offered every three years for the best dissertation on the results of original research in medicine, the subject to be chosen by the writer. The Boylston Prize Medal will be added to the money prize only in case the winning essay shows special originality in the investigations detailed. In awarding these prizes, preference will be given to dissertations which exhibit original work; if no dissertation is considered worthy of a prize, the award may be withheld.

Dissertations entered for this prize must be in the hands of the Secretary on or before December 31 of the year in which the prize is offered.

The address of the Secretary of the Boylston Medical Committee is Dr. Henry A. Christian, Peter Bent Brigham Hospital, Boston, Mass.

### Sofie A. Nordoff-Jung, Cancer Prize

The Commission for the distribution of the Prize for Cancer study founded by Doctor Sofie A. Nordoff-Jung, in agreement with the Foundress, has resolved to distribute the Prize from now on only every two years to the double amount of the sum allotted heretofore, that is One Thousand (\$1000) Dollars. The next prize will reach distribution in 1926.

For further information address, Dept. of Biology, Georgetown University, Washington, D. C.

### American Congress on Internal Medicine

The Ninth Annual Clinical Session of the American Congress on Internal Medicine will be held in Washington, D. C., March 9-14, 1925.

Practitioners and laboratory workers interested in the progress of scientific, clinical and research medicine are invited to take advantage of the opportunities afforded by this session.

Address enquiries to the Secretary-General, Frank Smithies, 1002 N. Dearborn St., Chicago, Ill.

## Books Received

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DISEASES OF WOMEN. By Ten Teachers. Under the direction of Comyns Berkeley, Obstetric and Gynecological Surgeon to the Middlesex Hospital, etc. Edited by Comyns Berkeley, H. Russell Andrews, and J. S. Fairbairn. Illustrated. Third Edition. Edward Arnold & Co., London, 1924.

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PRACTICAL MIDWIFERY. By Gibbon Fitzgibbon, Master, Rotunda Hospital, Dublin. With 175 illustrations. J. and A. Churchill, London, 1923.

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## Original Communications

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### THE CORRELATION OF UTERINE AND TUBAL CHANGES IN TUBAL GESTATION\*

BY EMIL NOVAK, M.D., AND H. LAURAN DARNER, M.D., BALTIMORE, MD.  
(From the Gynecological Department of Johns Hopkins Medical School)

IT has long been known that the occurrence of tubal pregnancy calls forth a more or less marked decidual reaction on the part of the uterine mucosa. There is, however, no unanimity of opinion as to the correlation of these uterine changes with those noted in the pregnant tube and with the clinical symptoms presented by the patient. Many points of practical importance are bound up with this general question. For example, one frequently reads the statement that the microscopic examination of the uterine scrapings in a case of suspected tubal gestation is of great value in arriving at a correct diagnosis. This statement, as we shall try to show, is correct only when strongly qualified. Again, much interest attaches to the study of the uterine mucosa as a source of the bleeding in cases of tubal pregnancy. This question, so thoroughly studied by Sampson<sup>1</sup> in 1913, has been recently reopened by the contributions of Polak and Welton<sup>2</sup> and others. In addition, there are, of course, certain questions of more purely pathologic interest to be considered, such as the perennial one of whether or not a genuine decidual reaction is to be observed in the tube, and if so, whether it is in any degree comparable to that seen in the uterus.

It is only with such matters of correlative interest as those we have just indicated that we shall concern ourselves in this paper.

*Material Studied.*—The material which we have been able to gather as bearing on this question consists of twenty-one cases of tubal preg-

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\*Read at a meeting of the New York Obstetrical Society, December 8, 1924.

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."



nancy in which the uterine mucosa, as well as the pregnant tube, is available for study. In fifteen of these cases hysterectomy had been performed for one indication or another. Most frequently the reason for the hysterectomy was the presence of extensive pelvic inflammatory disease, with a functionally worthless opposite tube. In a few cases, the latter had already been removed at a previous operation. The uterus was never removed merely because of the possibility of a repetition of tubal pregnancy. In three cases the uterine mucosa was available for study because a curettage had been performed before the laparotomy, although the uterus itself was not removed. Finally, in three cases, at least some idea of the endometrial process was obtained from the study of uterine casts which had been expelled by the patient.

The study of this comparatively small series in which both tubal and uterine changes could be observed was, of course, supplemented by the clinical and pathologic review of a far larger number in which the much more common procedure of salpingectomy or salpingo-oophorectomy alone had been carried out. Many of these cases were very pertinent as regards certain aspects of our investigation. For instance, even without a study of the endometrium, much evidence as to the causes of the uterine bleeding can be obtained from a consideration of the tubal pathology itself, as we shall try to show.

Our material was obtained from cases operated upon in the Johns Hopkins Hospital, together with a number encountered in the private practice of one of the present authors. One of the cases was made available for study through the kindness of Dr. George L. Streeter, director of the Carnegie Laboratory of Embryology, who generously placed his extensive collection entirely at our disposal and extended the most helpful cooperation in many ways.

#### THE DEVELOPMENT AND FATE OF UTERINE DECIDUA IN CASES OF TUBAL PREGNANCY

Very soon after the occurrence of fertilization—just how soon cannot state with precision—decidual transformation of the endometrium is noted. There is no sharp dividing line between the histological picture of premenstrual hypertrophy of the endometrium and that of the young decidua. The former is properly spoken of, from a teleological standpoint, as a pregravid endometrium. In other words, the endometrium of every woman during reproductive life prepares it once every lunar month for the reception of an impregnated ovum. If pregnancy does not occur, the preparation in the endometrium is rendered unnecessary and the transformed endometrium, or at least a considerable portion of it, is cast off. If, on the other hand, the ovum is fertilized, it finds a bed already prepared for it in the modified endometrium, which passes by easy stages into outspoken decidua.

The histologic structure of the latter is so well known that we shall not stop to discuss it here. Suffice it to say that the decidual transformation is noted whether the pregnancy be intra- or extrauterine. This much is universally accepted. Considerable confusion, however, exists as to the later course of events.

It seems safe to assume, although we have no direct evidence bearing on the point, that in the suppositious case of tubal pregnancy advancing without interruption to the later months, the uterine decidua would exhibit the same features as the decidua vera of intrauterine pregnancy, with perhaps the absence of such thinning and atrophy as is explained by the mechanical pressure of the amniotic contents. Unfortunately, however, the course of the tubal fetus does not run so smoothly as does that of the more happily located uterine embryo. It usually survives only a short time, and its death exerts a very profound influence upon the uterine decidua. This is thrown off, either in one large cast of the uterine cavity or in particles of much smaller size.

In the former event the patient is likely to note the expulsion of the cast, but in a large proportion of the cases, the physician does not get an opportunity of studying it. Only too frequently it is not observed or its importance is not appreciated by the patient, and the tissue is not secured for study. We are convinced that the expulsion of uterine casts occurs far more frequently than is commonly believed. Polak believes that casts are actually expelled in fully 50 per cent of all cases, and we do not believe that this estimate is too high.

It is probably true, however, that in not a few cases, intrauterine degenerative changes, perhaps of autolytic nature, cause a disintegration of the cast before expulsion. It is probable, also, that the decidua is in some cases thrown off in small particles from the deeper uterine layers, so that in such cases no uterine cast is expelled by the patient.

A striking feature of the early decidua is the presence of many venous channels, especially in the superficial portion of the compacta and, even more, in the line of junction of the compacta and spongiosa. This distribution was well brought out in the injection studies of Sampson. The latter believes that these veins are the source of the uterine bleeding. It seems quite probable, too, that they may play a rôle in the separation of the decidua. We have been struck by the frequent finding of thrombosis in these large spaces (Fig. 1). It is so common as to seem physiologic in character. Perhaps it is due to some biochemical factor engendered in the mucosa, and it is possible that by blocking the circulation this thrombosis may bring about the casting off of the more superficial layers. A similar though less extensive process is seen in the early stages of menstruation.

The separation and expulsion of the uterine decidua in cases of tubal pregnancy must at once call to mind the casting off of the cor-

responding layers in the nonpregnant woman at the time of menstruation. It now seems probable<sup>3</sup> that the compact layer and a greater or lesser portion of the spongy layer are characteristically thrown off at the menstrual periods, and that regeneration of the endometrium proceeds chiefly from the basal layer, which is not cast off. There is every reason to believe that regeneration after the expulsion of the uterine cast seen with ectopic pregnancy proceeds in essentially the same manner. The degenerative changes of menstruation are apparently caused by the death of the ovum thrown off at the immediately preceding ovulation, usually something like two weeks previous to the beginning of the flow. This ovum, hypothetically, possesses a potential span of extra-follicular life of about two weeks, and the ter-

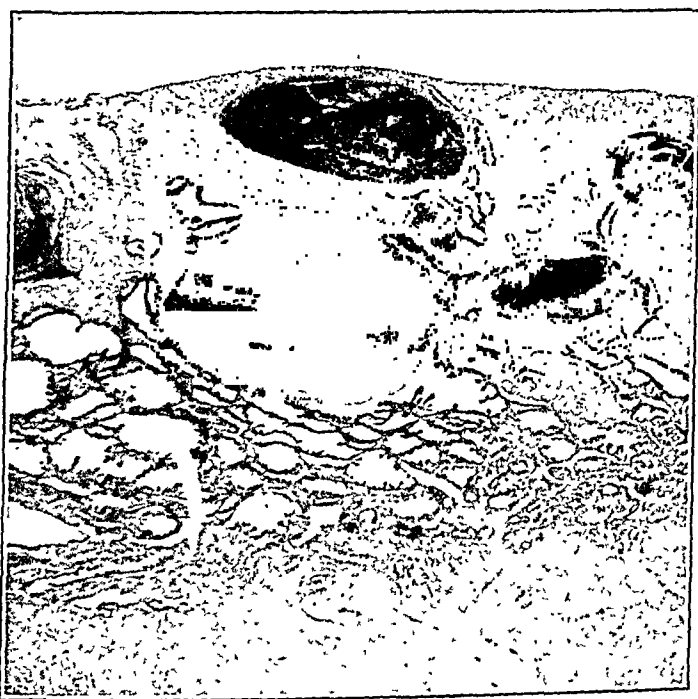


Fig. 1.—Uterine decidua, showing large venous channels, often thrombosed, occurring just beneath the surface and at the junction of the compact and spongy layers.

mination of this span before fertilization means that the menstrual decidua will be thrown off.

In the same manner it seems that the life of the uterine decidua is bound up with the life of the impregnated ovum. As long as the embryo, uterine or tubal, is alive, the decidua is intact. When the embryo dies, the decidua undergoes the degenerative change above described. There are several facts which make it difficult to correlate chronologically the death of the embryo and the degeneration of the decidua. In cases of tubal pregnancy, the death of the fetus is obviously harder to determine clinically than in cases of uterine pregnancy, in which the fetus is quite commonly expelled from the uterus. Again, even though fetal death is responsible for the throwing off of

the decidua, it must not be assumed that the sequence is always an immediate one. This point was well illustrated in one of our recent cases, in which operation showed a live fetus of about three months' development. Incidentally, this patient had had no vaginal bleeding. It was predicted that the decidua would be expelled soon after the operation. However, it was nearly seventy-two hours before this expulsion occurred. It is probable that a much longer period elapses in many cases. In other words, the expulsion of a cast signifies that the embryo has succumbed, but just how long a time before, one cannot say.

What has just been said as to the throwing off of decidua is clearly demonstrable in at least a certain proportion of cases, i.e., those in which definite casts are thrown off. It cannot as yet be accepted that this same mechanism occurs in all cases, although this is possible. As stated above, the decidua is in some cases thrown off in small frag-



Fig. 2.—Uterine mucosa from a case of tubal pregnancy in which vaginal bleeding had been present for many weeks. The decidua has apparently long since been cast off, although remnants of it are still to be seen. The regeneration of the mucosa is apparently quite complete, and it now appears as a postmenstrual endometrium, with intact surface.

ments rather than in one large cast. There are many, however, who believe that the decidua often merely undergoes a process of shrinkage or involution, and that loss of tissue is not the invariable rule. Indeed, it is so rarely that one obtains sections of the uterine wall in which the decidua is "caught in the act" of expulsion that one can scarcely speak dogmatically on this point. Fig. 2, we believe, shows the process of detrusion going on. Particles of decidua are lying free after their detachment, while the epithelial re-covering of the deeper layers is already well under way.

In only one case did we encounter an endometrial picture which was not easy to reconcile with the views here expressed. This was in

a uterine scraping from a ruptured tubal pregnancy in which there had been at least slight external bleeding for two weeks. It was difficult to decide whether the histologic picture in this case was to be construed as a slightly retrogressive decidua, or whether it merely represented a decidual reaction which was somewhat less marked than is often observed. On careful inquiry into the history we found that, while there had been a slight show of blood for two weeks before the operation, this can probably be explained by the patient's admission that she had repeatedly inserted an orange stick into the uterus for the purpose of producing an abortion. The pregnant tube was the seat of a hematosalpinx, in which numerous well-preserved villi were seen. This at once brings up the question of whether or not the fetal trophoblast can retain its viability even after the death of the embryo, i.e., whether it can still proliferate and perhaps give off a hormone which, as it were, protects the decidua from dissolution. This question was studied many years ago (1892) by Berry Hart, who denied the possibility of a persistent trophoblastic activity after the death of the fetus. There is much reason, however, to doubt his conclusions. Certainly such a hang-over of trophoblastic activity would go a long way toward explaining the persistence of the bleeding in many cases of both intra- and extrauterine pregnancy.

The microscopic appearance of the villi is often an untrustworthy criterion of the life or death of the embryo. It is not infrequent to find that, even in an obviously old ruptured pregnancy, many of the villi are quite well preserved, while in other cases, in which the history indicates that the embryo has only very recently been destroyed, villi may be seen which show advanced degeneration. It is not unusual, in either intrauterine or extrauterine pregnancy, to find well-preserved, sharply staining villi side by side with villi showing extreme fibrotic or myxomatous degeneration. Presumably these differences are dependent upon whether the fixation of the particular villi to the tubal wall has been preserved or lost. It is thus not hard to conceive that some villi are still physiologically active and that others are physiologically dead. This would perhaps explain why the uterine bleeding of tubal pregnancy may in some cases persist for many weeks, even though the endometrium itself is perfectly normal. We know too little as yet concerning the biochemistry of the reproductive apparatus to do more than theorize on such questions as this, but structural changes alone fail to explain much of the varied symptomatology of extrauterine pregnancy.

It would, of course, be interesting to study the mechanism of decidual separation in these cases by examining uteri in which this separation is actually going on. The securing of uteri at this particular phase, however, must necessarily be only an occasional lucky find. Fig. 2, already alluded to, we believe illustrates the process very

clearly. A second instance encountered in our series was observed in a woman who had had amenorrhea for two months and then had been taken with severe pains and bleeding, suggesting that the fetus had probably succumbed. At operation four days later the cast had not yet been thrown off, but an examination of the decidua showed in many places a definite line of separation forming, even on naked-eye examination (Figs. 3 and 4). This is borne out by the microscopic

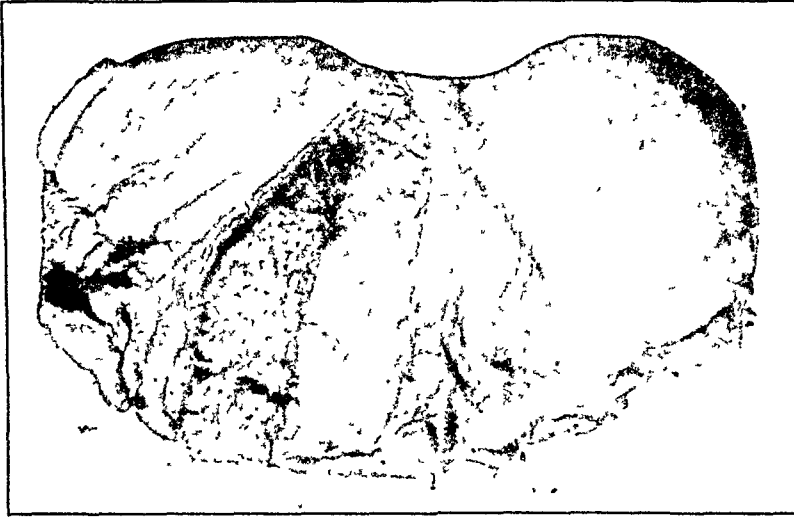


Fig. 3.—Interior of uterus in a case of cornual pregnancy, showing large shaggy decidual mass which was apparently soon to be thrown off. See also Figs. 4 and 5.



Fig. 4.—Cut surface of uterus shown in Fig. 3. Note the thick decidua still in situ, although evidences of its separation are already apparent.

examination, by which the line of separation is clearly discernible (Fig. 5).

From what we can learn by the study of decidual casts, it would seem safe to conclude that the separated portion consists chiefly of the compacta, with often a greater or less portion of the spongiosa. There is considerable variation in the thickness of casts, as shown by a comparison of Figs. 6 and 7. The analogy with the menstrual decidua would seem quite complete. The regeneration of the endo-

metrium, after the casting off of the decidua, apparently proceeds chiefly from the basalis, as after menstruation. It soon assumes the characteristics of the normal nonmenstruating endometrium, and, as obtained at operation, is most commonly of the interval type, with little or no evidence of its former decidual characteristics (Fig. 8).

In a recent paper Polak and Wolfe<sup>4</sup> called attention to the interesting fact that if the uterus be curetted in a case of tubal pregnancy, and the latter proceeds in its development, a new decidual reaction takes place in the uterus. This is just exactly what one would expect, and although we have had only one opportunity to demonstrate this fact histologically, we are convinced of its general correctness. Our patient (Case 2) had been curetted ten days before admission to the



Fig. 5.—Microscopic appearance of decidua shown in Figs. 3 and 4. To the right is seen the separating cast, made up of the compact layer and the upper layers of the spongiosa. The surface itself is not shown in this picture, but it consisted of a very flat epithelium.

hospital. The abdominal operation was preceded by a curettage, the curettings showing definite decidual reaction. A living embryo was found when the abdomen was opened.

#### STRUCTURE OF DECIDUAL CASTS

Just what thickness of the decidual layer is cast off we have no way of determining except by a study of the structure of uterine casts or an examination of the uterus after the tissue has been thrown off. The latter is, of course, rarely possible before regeneration has advanced to a greater or less degree, so that our information must come chiefly from the microscopic examination of the casts. When in a good state of preservation these are found to consist of the upper or compact layer of the decidua, with at times a portion of the deeper or spongy layer. The surface of a typical cast is covered with a single

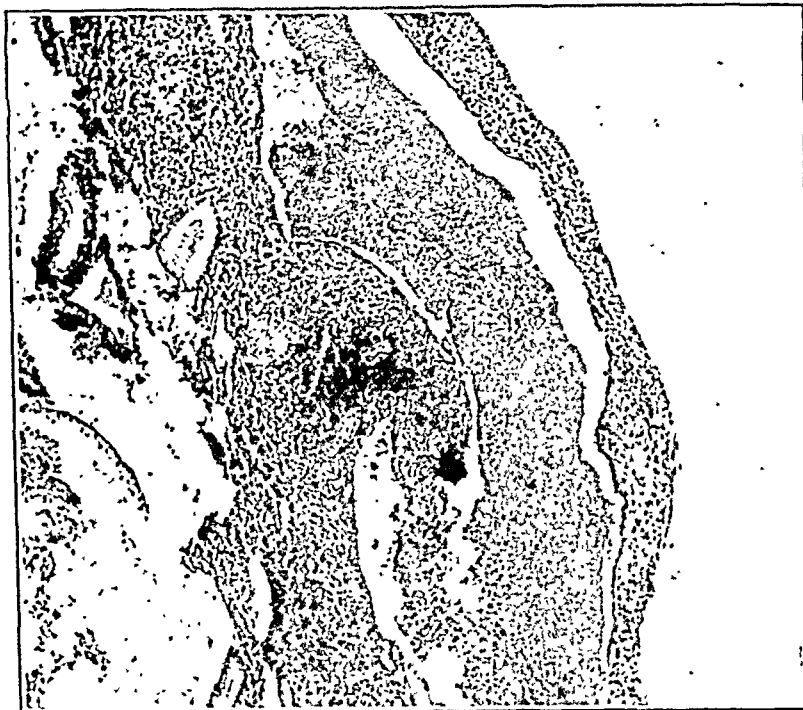


Fig. 6.—Microscopic structure of a thin cast, made up of only the upper stratum of the compact layer.

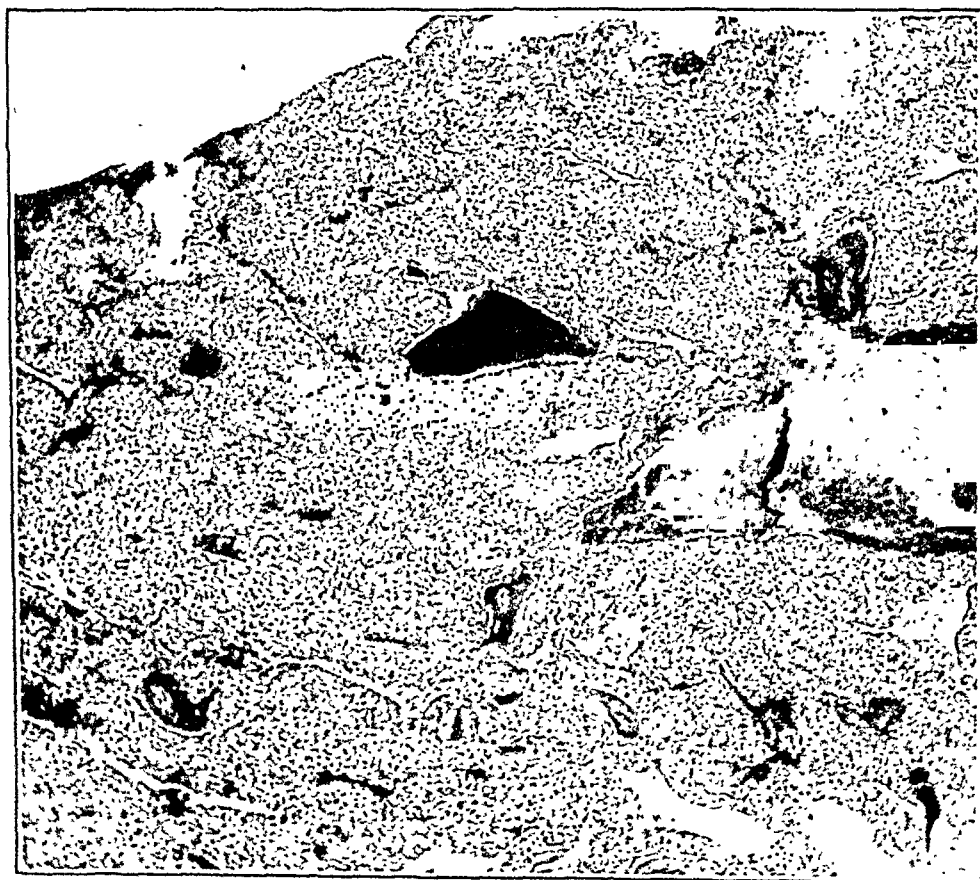


Fig. 7.—A thick cast, comprising the entire compact layer, with also a small portion of the spongiosa. Note the broad field of decidual cells, the thrombosed veins, the infiltrating leucocytes, the very flat epithelium of the few glands which are shown, etc.



layer of flattened epithelium. Beneath this is a great field of typical decidual cells, characterized by their mosaic arrangement, their polygonal outline, and the large, rather pale nuclei (Fig. 7). Among these cells are to be seen a greater or lesser number of thin-walled blood vessels, not infrequently thrombosed. There is also considerable infiltration with polymorphonuclear leucocytes, as well as mononuclear cells which are perhaps of lymphocytic nature. This latter statement, it may be added, is questioned by some, who look upon these round cells as of stromal nature and as precursors of the decidual cells themselves.



Fig. 8.—The completely regenerated endometrium, in a case where vaginal bleeding has been present many weeks, and where the embryo has long since succumbed. All trace of decidual reaction has disappeared, so that the microscopic examination of curettings from such a case would be of no diagnostic value. This, moreover, is the type of case most commonly encountered.

Glands are few and far between in this compact layer. They occur usually in the form of slit-like lumina lined by a very flat endothelium-like epithelium. In some casts there is a considerable amount of the spongiosa below the compact layer just described. In these there are seen a considerable number of the characteristic pregnancy glands. These are, in very young decidua, markedly tortuous, with low and pale-staining epithelium. In the slightly older cases the glands lose some of their tortuosity, possessing large and only slightly irregular lumina lined by very flat epithelium. At times, indeed, it is difficult on superficial examination to distinguish them from lymphatic spaces.

## THE VALUE OF DIAGNOSTIC CURETTAGE IN TUBAL GESTATION

It is only occasionally that the microscopic examination of uterine curettings is invoked in the diagnosis of tubal pregnancy. At times, however, this is justifiable, as in suspicious cases of uterine bleeding occurring in obese women. It may be impossible to distinguish between the bleeding of a tubal pregnancy which cannot be palpated and that of incomplete early abortion of an extrauterine pregnancy. The occasional diagnostic value of curettage in cases of suspected tubal pregnancy is well illustrated in two cases recently reported by Cullen.<sup>15</sup>

If definite decidual tissue is obtained at curettage, and if it be not accompanied by chorionic villi, one is justified in thinking of the probability of extrauterine pregnancy. This, however, will not invariably prove to be correct, as the case reported by Frank<sup>5</sup> clearly illustrates. This patient had had amenorrhea for two months, followed by slight occasional spotting. There were some subjective signs of pregnancy, together with attacks of fainting, but no pain. The uterus was slightly enlarged. Several days later she passed a typical triangular cast, made up of fully developed decidua without villi. A diagnosis of tubal gestation was made, but the next day the patient, just before leaving for the hospital, passed another small mass, which proved to be a small degenerated ovum. She then rapidly recovered. Frank interprets the course of events in this case as due to a separation of the ovum from the decidua, followed by its complete enclosure in blood, and later by a throwing off of the decidua alone with further bleeding. This would explain the absence of villi in association with the decidua. Such an occurrence would, of course, be exceptional, for as a rule one is reasonably sure to find villi in curettings from patients who have aborted so recently as to show well-formed decidua. In this connection we must emphasize the importance, in all doubtful cases, of examining a large number of sections from all parts of the curetted material. One of the most common errors in most laboratories of gynecologic pathology is lack of thoroughness in this respect.

As regards the recognition of decidual tissue under the microscope, especially if villi be not observed, one must of course never lose sight of the fact, already mentioned, that the premenstrual hypertrophy of the nonpregnant endometrium not infrequently is so pronounced as to simulate the appearance of decidua very thoroughly. As a rule, it is true, the stromal cells show only a suggestion of the true decidual transformation, while the glandular hypertrophy is also less marked. At times, however, the distinction is not so easy.

When curettage is done in cases of tubal pregnancy, it is almost always in cases where uterine bleeding has been present for a considerable time, i.e., where the embryo has long since died and usually

been absorbed, and where the decidua has long since been cast off. Under these conditions microscopic examination commonly yields a normal endometrium, with no evidence of the decidual change which was present at an earlier period. The picture is usually that of a postmenstrual or interval type of endometrium (Fig. 8). The explanation of this seems simple enough in the light of what has been said in the preceding section, and yet one will seek a long time for a proper presentation of the point in the textbooks and literature generally. The impression commonly conveyed is merely that tubal pregnancy causes uterine decidual change, without accompanying this statement with the proper chronologic and other qualifications. Hence one frequently hears surprise expressed if a normal, nondecidual endometrium is found in association with a tubal gestation. It need scarcely be added that the foregoing discussion of the diagnostic value of curettage in tubal pregnancy has been along purely pathologic lines, and that we are not here concerned with such questions as, for example, the definite danger of rupturing a tubal sac by a roughly performed curettage.

From what has been said it may be concluded that in a large proportion of cases, more particularly in those in which bleeding has been a symptom, little or no information of diagnostic value is to be looked for from the microscopic examination of the uterine scrapings.

In our own series of twenty-one cases, eleven showed an endometrium of the normal postmenstrual or interval type, so that curettage in such cases would have given no help in the diagnosis. In seven cases there was definite decidual change, so that in these, some help would have been obtained from curettage. In practically all of these, however, curetting would have been contraindicated, as there was an amenorrhea, with of course the possibility of an intrauterine pregnancy. It should be emphasized, moreover, that in the present series there is an unusually large proportion of the cases with well-preserved decidua, owing to the manner of selection of the cases for this series. In any large consecutive series of cases of extrauterine pregnancy, the common type will be found to be that in which there has been abnormal uterine bleeding and in which the embryo has been destroyed. In these the endometrium will show no decidual characteristics, as a rule, so that curettage is of no particular diagnostic value. Sampson found twenty-four of his twenty-five cases to be of this bleeding type, and this would more nearly represent the usual proportion than does our own series.

#### THE SOURCE OF EXTERNAL BLEEDING IN TUBAL PREGNANCY

The thorough study of Sampson in 1913, already quoted, appeared to establish quite definitely that the source of the external bleeding in cases of tubal pregnancy is the endometrium. It may be added

that this is still the prevailing opinion, although Polak has recently suggested that in at least some cases, more particularly those of the interstitial type, the bleeding may have its origin in the tubal placental site itself. While this is perhaps true in a small minority of cases, the characteristic metrorrhagia of tubal pregnancy cannot be explained in this manner. To illustrate, in one of our recent cases there had been moderately free bleeding from the uterus for several weeks. And yet there was not a drop of free blood in the pelvic cavity, the tube being the seat of a rather large hematosalpinx, in which abundant chorionic villi were found. Furthermore, the fimbriated extremity was patent. It is scarcely conceivable that, if the bleeding arose in the tube, a considerable amount of blood would not have passed through the free end of the tube into the pelvic cavity, especially as the uterine bleeding was quite free. We are convinced that in this case, and also in most other cases, the metrorrhagia is really of endometrial origin, and that it is at least initiated by the separation of the decidua. The latter, as we have seen, is caused by the death of the embryo. In other words, so long as the embryo is alive, the decidua is intact and there is no bleeding.

In our series of twenty-one cases, uterine bleeding was a symptom in fifteen. The duration of the bleeding varied from a few days to many weeks. In all of these cases except two, the uterine mucosa was of the retrogressive nondecidual type, and in none of these thirteen was there a demonstrable embryo. One of the two exceptions was noted in a case in which there had been only a very slight show of blood at intervals for five weeks. At operation a well-formed, obviously live fetus, measuring 10 cm., was found. On the day following operation a perfect decidual cast was expelled. The other exception was seen in a recent case, already described above, in which slight bleeding had been present for two weeks before operation, but in which the bleeding was probably due to the patient's efforts at inducing an abortion, beginning a few days after the missing of a menstrual period. At this early stage, of course, no fetus was found, but numerous well-preserved villi were present in the tube. The laparotomy had been preceded by curettage, and the curettings show definite decidual characteristics, in spite of the early termination of the pregnancy.

By far the most interesting group of cases is that in which there was no uterine bleeding. There were six of these in our present series. The clinical picture presented by these cases was, of course, not the one which we commonly associate with extrauterine pregnancy. In most of them, however, the existence of this condition was strongly suggested by colicky pain, symptoms of intraabdominal hemorrhage, and the presence of a unilateral pelvic mass. In four of these cases a well-preserved, presumably live fetus was found, while in the other

two, both of which were very early, a fetus was of course absent, although well-preserved villi were present in the tube. In all of them there was a greater or less amount of abdominal hemorrhage, emphasizing the fact that the latter is not by any means indicative of the termination of the pregnancy. Far more significant in this respect is the external bleeding, which was absent in all of these cases. The importance of the findings in this group of six cases seems to us sufficient to justify their presentation in at least a summarizing fashion.

CASE 1.—M. B., age thirty-one, was seen by one of us (E. N.) on October 29, 1924, in consultation with Dr. H. F. Cassidy. She had been married ten years with no preceding pregnancies. She was suffering severe pain in the right lower abdomen. The last normal bleeding had occurred on August 31, since when there had been no vaginal bleeding except for a very slight show on September 28. There had been slight nausea for one month. The right lower abdominal pain had begun

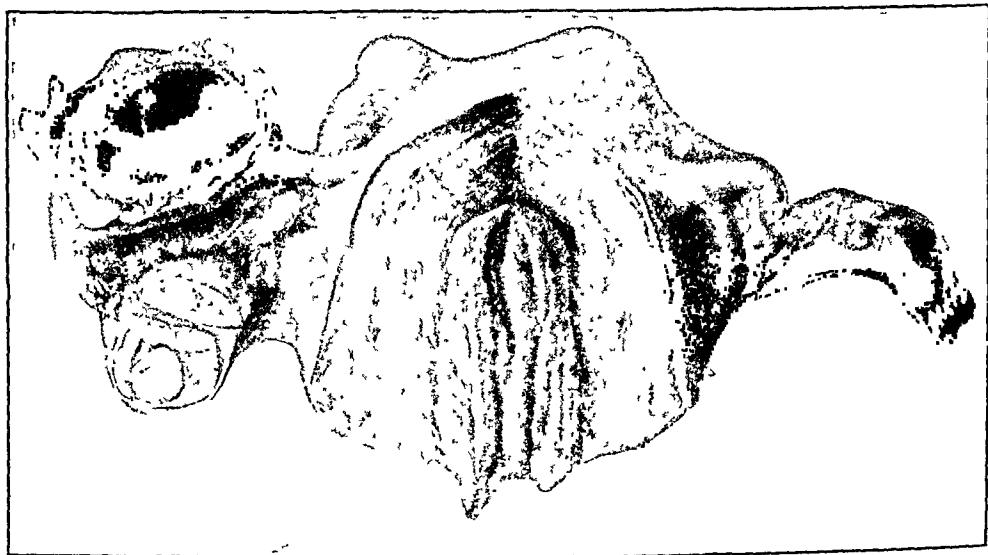


Fig. 9.—Right tubal pregnancy, with live embryo (Case 1). There was no external bleeding, although the abdomen contained much blood. The uterine decidua is beautifully shown. Had the uterus not been removed with the pregnant tube, the decidua would have been expelled as a cast, probably within a few days after operation. Supracervical hysterectomy was done because of impossibility of further pregnancies (left salpingitis) and presence of many uterine myomata. Note the large corpus luteum of pregnancy in the right ovary.

one week before the patient was seen. It was paroxysmal in character and accompanied by a feeling of faintness at times. When seen the patient was having such an attack, the picture strongly suggesting an intraabdominal hemorrhage. The pelvic examination was practically negative except for some tenderness high up in the right side. No mass could be felt, although the patient's very thick abdominal walls made examination very difficult. A diagnosis of right tubal pregnancy, with intraperitoneal hemorrhage and a probably living embryo, was made, and this was borne out by the operative findings. The abdomen was full of blood. The pregnant right tube had ruptured, the placenta being still attached to it, while an intact embryonic sac was being extruded from the broad area of rupture. The right ovary was somewhat enlarged and showed a large corpus luteum of pregnancy. The left tube was the seat of a moderate sized hydrosalpinx, while the uterus presented a number of myomata, the largest being about the size of a lemon. In view of these findings and the obvious impossibility of further pregnancies, it

was considered advisable to remove the right adnexa, the left tube, and the upper portion of the uterus, leaving sufficient of the latter to preserve menstruation. The patient made a smooth recovery.

Fig. 9 shows the unusual specimen obtained in this case. Aside from the findings already described, the most interesting feature is the remarkable decidual transformation of the uterine mucosa. The decidua is fully 1 cm. in thickness. It is still perfectly intact, with no evidence of separation. It is easy, however, to visualize the appearance of the cast which would have been thrown off had the uterus not been removed. The microscopic appearance of the uterine decidua is shown in Fig. 10.



Fig. 10.—Microscopic appearance of decidua shown in Fig. 9. Note the contrast between the compact and the spongy layers, with the predominance of decidual cells in the former, and of glands in the latter.

CASE 2.—A. R., age thirty-six, was seen on July 30, 1924, in consultation with Drs. B. O. McCleary and E. H. Henning. She had been married sixteen years and had three children, the ages being nine, seven, and five years. An operation for chronic appendicitis had been performed nine years previously. Menstruation had been normal until May 24, when the last regular period began. Following this there was complete amenorrhea until July 20, when a single small clot was passed. There was moderate pain in the left lower abdomen. For some unknown reason, a physician then called in performed a curettage. Following this the patient continued to suffer pain, although there was still no vaginal bleeding. Examination on July 30, when the patient was admitted, showed a definite pelvic mass, chiefly leftsided, so that the existence of a tubal pregnancy seemed probable, although it was not easy to eliminate altogether the possibility of a pelvic inflammatory disease following an incomplete abortion, or perhaps the curettage which was done at the patient's home. A diagnostic curettage was therefore done as a preliminary to the laparotomy. The curritings showed a definite though moderate decidual reaction. As stated above, the appearance of the mucosa suggests that, after the previous curettage, a decidual reaction had again manifested itself in the uterus,

under the influence of the still living product of conception. The abdomen contained much blood. An intact amniotic sac 5 cm. in diameter was protruding through the rupture in the tube, very much as in Case 1. Through its transparent wall could be seen an embryo of about 4 cm. .Definite though feeble movements of the fetal extremities were easily discernible. The left adnexa were removed.

CASE 3.—C. C., age twenty-seven years, was admitted on February 26, 1921. She had been married ten years and had had three children, the last three years previously. An operation for appendicitis had been done five years before. The last menstrual period occurred about two months before admission. Four days before entering she noticed a very slight spotting at times. For two or three weeks there had been occasional slight colicky pains in the left abdomen. On February 25, the night before admission, there was a severe attack of pain in this region, with fainting, vomiting, and weakness. There was still a very slight vaginal spotting. She was admitted on February 26, at which time she presented unmistakable evidence of internal bleeding, so that operation was done at once. The peritoneal cavity was filled with blood. The uterus presented a remarkable picture, as depicted in Figs. 3 and 4. It was the seat of a ruptured cornual pregnancy. The chorion lay embedded in a mass of blood, while the embryo had apparently succumbed sometime previous to the operation. It corresponded, according to Dr. Streeter, to a development of about six weeks, while the menstrual history, unfortunately not very clearly recalled by the patient, would suggest a duration perhaps a week or so longer.

The most interesting feature illustrated by this patient is the fact that even after fetal death occurs, a considerable period may transpire before the decidua is thrown off. The decidua, as seen in Fig. 4, is still retained, but even with the naked eye, the line of separation can be seen in many places. Microscopic examination confirms this impression, as shown in Fig. 5.

CASE 4.—F. C., age thirty-five years, was referred by Dr. Charles S. Neer, with a history of complete amenorrhea for three months, except for slight spotting one day about six weeks ago. For two months there had been many attacks of lower abdominal pain and faintness, often with vomiting. Recently, the abdomen had become much distended and very tense. This, with the patient's adiposity, made pelvic examination very difficult and unsatisfactory, and no definite mass could be made out. A valuable clue was furnished in this case by an unusually marked discoloration of the umbilicus (Cullen's sign). The discolored zone, fully two inches in diameter, was partly dark bluish and partly orange colored, not unlike a large bruise. With the evidence above mentioned, this seemed to make reasonably certain the diagnosis of ruptured tubal pregnancy, with a probably live fetus. At operation, in addition to the great amount of free blood present, we found also a fetus of about three months development, showing feeble movements of its extremities. The right adnexa were removed and recovery was satisfactory.

It was predicted at the time of operation that a uterine cast would probably be passed by the patient shortly after the operation. It was not until the third day, however, that this occurred. At this time a perfect cast was expelled.

CASE 5.—F. G., a colored woman of thirty, was admitted to the Hopkins Hospital on December 27, 1915. Menstruation had been very irregular for six years, the periods occurring usually every two or three months. There had, however, been no flow for five months before her entrance to the hospital. For two or three months there had been pain in the right lower abdomen with frequent nausea and vomiting and some pain on defecation. There was a history of three previous laparotomies, their nature not being known to the patient. At operation an unruptured tubal gestation sac was found in the left tube, the right adnexa having been removed at

one of the previous operations. A well-preserved fetus was present, while the uterine mucosa showed outspoken decidual change.

CASE 6.—E. M., age thirty-five, colored, was admitted to the Johns Hopkins Hospital on December 18. The last regular period had occurred on November 20. Three weeks before admission she began to suffer with severe cramp-like pains in the lower abdomen. There was much leucorrhea but no vaginal bleeding, except for very slight occasional spotting. At operation the pregnancy was found in the right tube. There was no free blood in the abdomen. There was found also a well-formed embryo which, according to Dr. Mall, corresponded to the development which the menstrual history would lead one to expect. There was a well-preserved decidua in the uterus.

In addition to these six cases, in which both the pregnant tube and the uterus were available for study, we have observed four other cases of tubal pregnancy in which uterine bleeding was absent. These are not included in our series of twenty-one cases, because the latter is limited to those in which the uterine mucosa was obtained for microscopic study.

CASE 7.—M. R., age thirty-five, referred by Dr. B. S. Rankin, of Tunnelton, W. Va., had missed two menstrual periods and had had the usual subjective signs of early pregnancy. Several days before admission she was taken with severe pain in the left iliac fossa and suffered a number of syncopal attacks. There was, however, no external hemorrhage whatever. A large sensitive mass filled the left side of the pelvis and there were definite signs of free intraabdominal hemorrhage, so that there seemed no doubt of the existence of a ruptured left tubal pregnancy. This diagnosis was confirmed at operation, and later by histologic examination. The patient recovered very nicely and returned to her home. Six weeks later, however, a letter was received from Dr. Rankin, stating that the patient had had an attack of uterine bleeding, followed by the expulsion from the vagina of a three months fetus. The explanation of the absence of uterine bleeding was then quite clear. The woman had had a combined intra- and extrauterine pregnancy, the uterus containing a small embryo at the time of the operation, although there was no way of recognizing this fact then. The presence of this live fetus within the uterus explained why she had had no external hemorrhage.

CASE 8.—M. R., age thirty nine, was seen on January 24, 1920, through the kindness of Dr. B. F. Kader, of Baltimore. She had been married many years and had had one child twenty-one years previously. There had been no pregnancies since then. Menstruation had been regular until November 29, which was the date of the last regular period. Since then there had been complete amenorrhea. Three weeks before admission the patient was taken with severe pain in the lower abdomen, especially marked in the left iliac fossa. These pains had been present since that time and had often been very violent. On the day of admission the patient was suffering excruciating pain, with nausea and some vomiting. At operation there was found a very much enlarged pregnant tube, from the fimbriated end of which there protruded an intact amniotic sac about the size of an orange. To the latter was attached the placenta, which was also beginning to emerge from the tube. Within the sac was a fetus of about three months' development, apparently living. The specimen, after removal, was examined by Dr. Streeter, of the Carnegie Laboratory of Embryology, who stated in his report that the fetus was undoubtedly alive at the time of operation. This would seem to explain the entire absence of uterine bleeding in this patient.

CASE 9.—B. B., age thirty-six, presented a rather remarkable case of secondary abdominal pregnancy. The patient had been married fourteen years without pre-



vious pregnancy. The date of the last regular menstrual period was March 21, 1919. About March 31 the patient was taken with severe pain in the epigastrium, with vomiting, and was uncomfortable for several weeks. Following the menstrual period in March, there was complete amenorrhea, and the patient considered herself pregnant. The abdomen gradually increased in size and fetal movements were perceived in September. On December 20, at about the time the patient expected to be delivered, she was surprised at the occurrence of a rather profuse menstrual flow, lasting about ten days. In January, 1920, there was amenorrhea, but the menses occurred regularly on February 19 and March 18. When seen on April 12, 1920, the abdomen was enlarged to the size of a full-term pregnancy, although the fetal parts could not be clearly outlined. The breasts showed a slight hypertrophy and a moderate amount of milk (not colostrum). Vaginal examination showed the cervix to be small and not very edematous, while extending upward toward the left iliac fossa, and apparently continuous with the cervix, was an indefinite, firm body, giv-

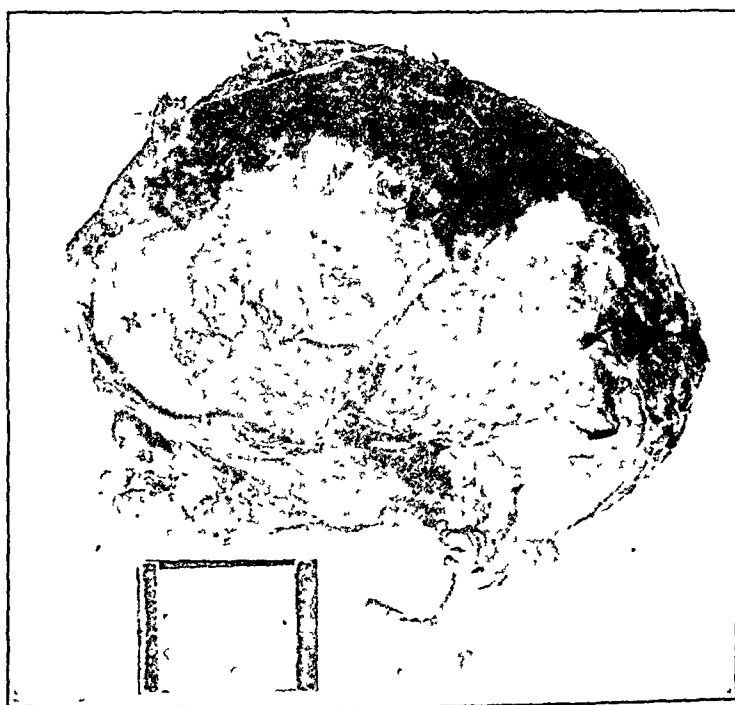


Fig. 11.—Right tubal pregnancy, with marked stretching of tubal wall. At area indicated by cross mark the movements of a live fetus could be plainly observed through the membranes, the tubal wall being absent at this point. There had been complete amenorrhea from May 17 to Aug. 2 (Case 10).

ing the impression of a nonpregnant uterus. Without going into further detail, it may be said that a diagnosis was made of abdominal pregnancy, with retention of a dead fetus. This was borne out by the operation, the details of which we shall not stop to describe. Our reason for mentioning this case is the fact that it illustrates some of the factors which are concerned with the uterine bleeding in cases of ectopic pregnancy. Throughout the course of the entire pregnancy this patient showed no metrorrhagia, but as soon as the death of the fetus occurred in December there was a profuse discharge of blood, menstruation thereafter occurring regularly, with the exception of the month of January. The amenorrhea in this month, it seems to us, is explainable by the onset of lactation, the hormone of the lactating breast, as is well known, exerting an inhibitory effect on menstruation.

CASE 10.—S. N., age thirty-nine, was seen on August 2, 1921, through the kindness of Dr. Thomas Brayshaw, of Glenburnie, Md. There had been complete

amenorrhea since May 17. Several days before admission she had been taken with severe pain, weakness, syncope, and vomiting. At operation the belly was found to be full of blood. The pregnancy was in the right tube, which presented a large ovoid enlargement, the size of a lemon, between the narrow isthmus and the clearly marked fimbriated extremity. The wall of this sac was enormously attenuated and in one large area absent, so that a window-like gap was left, through which the active movements of the fetus with amniotic sac could be clearly watched (Figs. 11 and 12). It was a rather striking picture.

It is of interest to note that several authors, notably Lewers,<sup>6</sup> have called attention to the fact that persistent amenorrhea is especially characteristic of the cornual type of tubal pregnancy. Wynne<sup>7</sup> in an investigation of thirty-six cases of cornual pregnancy, found that in fully twelve, amenorrhea was noted instead of uterine bleeding. This



Fig. 12—Cut surface of pregnancy sac in Case 10, showing embryo, alive at time of operation.

is unquestionably due to the fact that in this type the environment of the fetus is a closer approach to that presented in normal pregnancy, and that the fetus often survives for a much longer period than if it be located farther out in the tube.

The only case in which uterine hemorrhage was absent in Sampson's entire series of twenty-five was his Case I, in which operation disclosed an "intact decidual formation of the endometrium and a fetus 6 cm. long in the tube." He believes that the fetus was alive at the time of the operation. Another observation indicating the inhibitory influence of the live fetus upon the menstrual flow may be adduced in the common occurrence of amenorrhea in cases of ectopic preg-

nancy which progress to term. A considerable number of such cases have been collected in the recent paper of Zarate, Rojas and Widakovich.<sup>8</sup> An instance of this type was recently observed by one of the present authors (Case 9).

A comparison of the operative findings in the bleeding and non-bleeding groups above presented appears to justify the general conclusion that where bleeding has been present, especially for a considerable time, one will ordinarily find that the endometrium has retrogressed from its original decidual character. On the other hand, when amenorrhea has been observed, and especially where it has been of considerable duration, one may confidently expect to find a living fetus and a well-preserved uterine decidua. If the uterus be not removed in a case of this latter type, it may be predicted with reasonable assurance that the decidua will be expelled comparatively soon after the operation, most likely as a definite cast.

As to the immediate mechanism of the endometrial bleeding, it is impossible, in the present state of our knowledge, to do much more than theorize. Again, the analogy with the bleeding of menstruation suggests itself. In the latter there is no doubt that the bleeding has its source in a large measure from the open mouths of torn blood vessels (rhaxis). Just why it lasts a day or two in some cases and a week in others, or why, in abnormal cases, it may persist for many weeks, even though the surface covering of the uterus is perfectly intact and there are no open blood vessels, no one can as yet say. Obviously, we are here dealing with a biochemical problem of some sort, and the same thing is probably true of the bleeding of ectopic pregnancy. It is no doubt partly due to the actual trauma to blood vessels which the separation of the decidua entails, but this alone would not explain why bleeding often continues for many weeks after the casting off of the decidua and probably after the complete restoration of the endometrium. The cause of this prolonged bleeding is undoubtedly to be found in the fact that the death of the embryo is apparently a gradual one, and that many villi may remain alive, so to speak, while others are dying. The influence of the latter, presumably of hormone nature, is thus stretched over a long period of time, and may thus entail a long-continued though usually slight bleeding, perhaps long after the endometrial surface has been restored. So far as we know, however, there is no direct evidence as to the exact mechanism involved, and it seems unprofitable to speculate further concerning it.

#### THE OCCURRENCE OF DECIDUAL REACTION IN THE TUBES

It has long been a point of discussion as to whether genuine decidual tissue may be observed in the tubes. In more recent years, however, opinion on this subject has rather definitely crystallized, for

practically all writers now are agreed that a true decidual reaction does occur in the tube. On the other hand, there is a general agreement that the decidual cells never form a continuous and intact layer, such as one sees in the uterus. The reaction at best is a patchy and imperfect one, and in most routine sections cannot be made out at all. Much of the confusion on this subject has no doubt been due to incorrect microscopic interpretations. We are convinced, from a study of the illustrations accompanying the numerous articles on the subject, that a diagnosis of decidual tissue is frequently made when the connective-tissue cells of the tube have shown only a moderate hypertrophy, or when the edema so often present teases the cells apart, causes them to swell, and perhaps gives the tissue a somewhat mosaic appearance. It is indeed difficult at times, in the known case of tubal pregnancy, to distinguish such pseudodecidual changes from a genuine decidual transformation. The characteristic decidual changes of the endometrial stroma are, of course, the real morphologic criterion in this respect. They are rarely imitated with any perfection except in genuine müllerian tissue. And yet decidual reaction has been described in many portions of the abdomen far removed from the endometrium. In his recent excellent review of the subject, Dorland<sup>9</sup> has collected reports of decidual reaction in the posterior surface of the uterus, the anterior peritoneal surface of the uterus, the anterior surface of the rectum, the floor of the culdesac, the omentum, the ovary, the appendix, the cervix, the vagina, the peritoneum of the small intestine, and certain pathologic structures (such as adenomyoma of the uterus, parovarian cyst, bands of adhesions). To these might be added other locations of possible decidual reaction, as reported by other authors. Geipel<sup>10</sup> has described a number of instances of decidual transformation of the connective tissue of pelvic lymph glands, while Kehrer<sup>11</sup> has very recently described decidual changes in the connective tissue of the lutein zone of a corpus luteum cyst. Schmorl<sup>12</sup> indeed, asserts that the occurrence of peritoneal patches of decidual cells is physiologic, occurring in all pregnancies.

It is beyond the scope of this paper to discuss the general significance of the decidual reaction, or to theorize as to its occurrence in many locations in the pelvis. One point, however, justifies at least a passing thought. It has seemed of interest to us that, in a general way, the locations at which decidual islands have been observed are quite similar to those in which endometrial islands—the endometrial “implants” described by Sampson—have been found to occur. In the decidual islands which we have been discussing, glands are usually absent. We know of only a few cases in which gland-like spaces have been described—that of Lahm<sup>13</sup> and the few others quoted in his recent paper on the subject. It seems possible that there is some relationship between the two phenomena.

The mere occurrence of a decidual reaction would be interpreted by some as indicating that the tissue in question is of müllerian origin. This seems difficult to believe when one considers the wide distribution of the areas of possible decidual reaction and the developmental remoteness of many of them from the müllerian ducts. The same statement applies to the endometrial islands of Sampson, although the latter has explained these in a much more direct fashion as being due to the implantation of endometrial particles which pass from the uterus, through the fallopian tube, and are deposited on the ovary, the posterior uterine surface, or elsewhere in the pelvis. It is of interest to note that a somewhat similar theory as to the causation of the ectopic decidual islands was offered by Taussig<sup>14</sup> in 1906. He suggested that the decidual reaction is perhaps due to the presence of certain end-products of placental metabolism and that these may perhaps pass outward through the lumen of the tubes and produce the reaction on the ovaries or the pelvic peritoneum. Whether some such explanation as this is correct, or whether many portions of the pelvic peritoneum retain a vestigial sensitivity to the menstrual or pregnancy stimulus, no one is as yet in a position to state unqualifiedly. This, however, is scarcely the place to enter into a discussion of this problem, one of the most important and most fascinating in our domain.

In our own cases of tubal pregnancy we have, in a certain proportion, observed decidual transformation of the tubal connective tissue. The obvious pitfall in making such a diagnosis is to mistake for decidua the trophoblastic cells which invade the tubal wall so extensively. In many cases the trophoblastic nature of the cells is easy to recognize, as where the cells are directly continuous with the trophoblastic villous covering, or where there can be seen among them some of the characteristic syncytial giant cells. The latter can scarcely be mistaken for decidual cells. Where the invading cells are of the Langhans type, and where the continuity with the villous covering is not shown in the particular section under study, the question is a much more difficult one.

In other cases the appearance of the decidual cells is so typical, the existence of definite transition stages from the normal tubal stroma so clearly demonstrable, and the separateness of the area from the placental site so evident, that the diagnosis of decidual tissue permits of no doubt. When such changes are seen in a distant tissue, as in the opposite tube, the possibility of their being of trophoblastic nature can of course be altogether eliminated.

While the series of cases now under discussion was not studied intensively from this point of view, it may be stated, for its general interest, that in a number of tubes we have noted changes which we consider definitely decidual in the sense above indicated (Fig. 13).

In none of them was there a decidual layer which by any stretch of imagination could be compared to that seen in the uterus with normal pregnancy. In most of our sections the decidual cells occurred in small patches, although it is quite probable that if many sections had been cut with this point in mind, it would have been possible to demonstrate a decidual tissue in much larger amount.

#### SUMMARY

The paper is based upon the study of twenty-one cases of tubal pregnancy in which, in addition to the tubal gestation sac, the uterine mucosa was available for study, thus affording an opportunity of



Fig. 13.—Decidual reaction in a pregnant tube, shown especially about the vein running transversely near center of section. Contrast with the decidual cells the trophoblastic cells seen around the chorionic villi shown near top of section.

correlating the uterine and tubal changes in this connection. In fifteen cases the uterine mucosa was available because a hysterectomy had been done, in three because a preliminary curettage had been performed, and in three because a more or less perfect uterine cast had been expelled by the patient. The decidual reaction occurring in the uterus with extrauterine pregnancy is found to be identical with that of normal gestation so long as the embryo is alive. With the death of the latter, however, the superficial compact portion, with at times a considerable part of the spongy glandular layer, is cast off. Its expulsion from the woman's vagina, however, may not take

place for a considerable period, perhaps many days, after its separation from the deeper layers. The mechanism of the separation is strongly suggestive of that observed in connection with the throwing off of the corresponding portions of the endometrium in the non-pregnant woman at the time of menstruation. The same statement applies to the process of regeneration. In view of the degenerative and autolytic changes involving the sequestered decidua, it is not infrequently thrown off in smaller particles rather than as a large cast of the uterine cavity. We have found no evidence, in our own series, that the decidua merely involutes or shrinks, without loss of tissue, as has been claimed by some. It is possible that the "physiological thrombosis" which apparently occurs in the venous channels of the endometrium may play an important part in the degeneration and separation of the decidual layer, perhaps by its effect upon the blood supply of the tissues.

From what has been said, it follows that the decidual cast of extra-uterine pregnancy is made up chiefly of a mass of decidual cells, representing the superficial or compact layer of the placenta. The surface epithelium is very flat, as is that lining the few slit-like gland spaces near the surface. Very often, however, a considerable portion of the spongiosa is attached to the compacta, being characterized especially by the presence of the typical pregnancy glands. Large venous thromboses are also commonly observed.

The overwhelming majority of cases of tubal pregnancy come under observation only after the death of the embryo. In these cases the endometrium has retrogressed from its originally decidual character. The microscopic examination of uterine curettings in such cases is of very little diagnostic value. On the other hand, the histologic study of the uterine mucosa in those cases where the pregnancy is still developing actively shows a typical decidual reaction. When curetting, in a doubtful case, yields such a mucosa, without villi, the information gained is very valuable, though not conclusive. Unfortunately, however, cases of this type are curetted far less frequently than those of the other group, for they are characterized clinically by amenorrhea, with the possibility of intrauterine pregnancy.

The external or vaginal bleeding of tubal pregnancy is characteristically of endometrial origin, having its source, as Sampson has shown, in the venous channels of the endometrium. It is initiated by the separation of the placenta, although other factors, probably of hormone nature, are undoubtedly concerned in its frequent continuance for many weeks. The source of this factor in keeping up the bleeding is probably in some unknown way associated with the persistence of trophoblastic elements in the tubal wall long after the actual death of the embryo. The analogy with both the normal and the abnormally prolonged menstrual bleeding may again be invoked.

Decidual reaction in the tubal wall occurs in at least a fraction of the cases. It is never in any way comparable with that seen in the uterus, being usually patchy in its distribution. Mistakes in the diagnosis of decidual tissue in such cases are frequent, for a pseudodecidual picture is common in the connective tissue from simple hyperemia or edema. Moreover, great care is necessary to avoid mistaking for decidua the trophoblastic cells which invade the tubal wall so widely. In certain cases, however, the morphology of the cells is so typically that of decidual cells, their distinctness from the gestation site is so clearly discernible, and their derivation from the connective tissue so definitely suggested by the presence of transition stages, that the diagnosis permits of no doubt. Furthermore, the occurrence of certain cases in which the reaction is noted in the nonpregnant tube of the opposite side is even more convincing. Finally, attention has been called to the not infrequent finding of islands of "ectopic decidua" on the ovary, the posterior surface of the uterus, and many other locations in the pelvis, and the suggestion is offered, without as yet any definite proof, that there may be some connection between such decidual islands and the "endometrial implants" described by Sampson. The latter, it will be recalled, have pretty much the same distribution as that of ectopic decidua.

In conclusion, we wish to express to Dr. Thomas S. Cullen our appreciation of his kindness in placing the clinical and pathologic resources of the department so completely at our disposal. Moreover, we must once more publicly acknowledge our heartfelt appreciation of the warm interest and cooperation of Dr. George L. Streeter, the director of the Carnegie Laboratory of Embryology, who opened up to us his rich storehouse of material and gave us every possible assistance.

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26 EAST PEFSTON STREET.

(For discussion see page 398.)



## THE CONSERVATIVE TREATMENT OF ECLAMPSIA\*

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THERE is no longer a doubt as to whether the radical treatment or the conservative should be followed, as statistics by even the most ardent advocates of surgical interference in eclampsia show that better results are obtained at present by conservative measures. In consequence, delivery by high forceps, forcible dilatation of the cervix and vaginal cesarean section are relegated to the past and abdominal cesarean section is only recommended in cases of primiparae with a long undilated cervix in whom convulsions continue in spite of a fair application and test of conservative measures.

A number of therapeutic measures are used in the conservative treatment of eclampsia that give rise to considerable discussion whenever this important subject comes before a medical society. With the advances made in so many branches of medicine it should seem possible now to settle definitely some of these disputes and clear the field for a simplified and rational treatment.

Naturally the control of the convulsions should have our first consideration. It is not necessary in this Association to state that chloroform is absolutely contraindicated as it produces the same pathologic changes in the liver caused by the toxemia. The first point in question then would be as to whether ether or nitrous oxide is the more desirable agent for their immediate relief.

From my observations of eclamptic convulsions, when the initial twitch has begun, the patient goes through the entire procedure, opisthotonos, cessation of breathing, etc., regardless of what anesthetic is administered. With the spasmodic contraction of the diaphragm that is incident to the convulsion, it is questionable whether the patient inhales at all.

After the attack is over and the deep stertorous breathing begins, then deep inhalations occur but there is no necessity for an anesthetic then, because the convulsion is over. Consequently, it should be conceded, that when a patient has an eclamptic seizure, the only thing to do is to place a folded napkin between her teeth to prevent biting of the tongue, turn her head to the side and low in order that fluids may run out of her mouth and not be aspirated into the lungs, when the deep respirations begin after the attack is over. The patient should not even be restrained any more than is necessary to keep her from

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falling off the bed. Handle the patient as we do one in an epileptic fit. If anything is to be inhaled at all, the time for it is after the attack is over and then the only rational and beneficial thing is either an abundance of fresh air or oxygen gas if a tank is available.

Morphine is used very generally and in rather heroic doses to prevent further convulsions. It has been discarded in the Rotunda method however, as Fitzgibbon claims that it does not accomplish this purpose.

Paraldehyde intravenously in 0.5 to 2 c.c. doses is used at the Sloane Maternity of New York to control convulsions until the patient is under the influence of the morphine.

We are not even in accord as to the character of room in which the patient is to be placed. In most instances it is recommended that the room be darkened, the patient's ears plugged with cotton and absolute quiet prevail. On the other hand we are told that the room should be bright in order that the nurse may detect the onset of any cyanosis, because an eclamptic patient will not expel the fluids that embarrass respiration and that may at any moment cause a fatal asphyxia. It should be easy to compromise upon this point by having the patient in a quiet room free from glaring light in order that she be not unnecessarily disturbed, but that observation and the ready carrying out of all measures for the relief of the patient may be followed systematically.

Should gastric lavage be practiced? It may be claimed that it will disturb the patient and bring on convulsions. On the other hand if the tube is introduced under nitrous oxide anesthesia, no convulsions should occur. It is claimed that the fetal toxins require the same digestive ferments that are used in the digestion of food and that if there is an excess of fetal toxins there will be no digestive ferments for the food and this in turn becomes a virulent toxin and precipitates the eclampsia.

It is well known that many of our eclampsia cases give a history of partaking of some very abnormal foods just preceding the attack and it is reasonable to suppose that the removal of these toxic products by the stomach tube should immediately remove one source of cerebral irritation. Besides, the stomach tube serves as the best means of introducing a purgative in the unconscious patient who cannot swallow. Croton oil has been largely discarded. It has been found too drastic, and such urgent haste for speedy effect is no longer considered necessary. It has been displaced by magnesium sulphate given both into the stomach after gastric lavage and the bowel following colonic washings. No doubt the antitetanic action of the drug is taken into consideration here, besides its effect as a hydrogogue cathartic.

To some of us, it seems that hot packs should not be discarded. It must be remembered that with modern paraphernalia and with trained

nurses, it is no longer the cumbersome procedure of former days. Most hospitals are equipped with the electric blanket that can be readily put over the patient. A uniform and continuous heat can be applied and the patient is not subject to chilling as with the wet blanket method formerly used. It is claimed that the eclampsia toxin is a proteid and that when sweating is resorted to only water is excreted and the toxin is retained in even greater concentration, also that the edema has a protective influence and should not be removed. We have, however, continued using the pack, not so much for its diaphoretic effect, but because it quiets and relaxes the patient and expedites labor to such an extent that at times delivery takes place in the blankets.

Perhaps the most important question is that of venesection. If it is conceded that the eclampsia toxin is circulating in the blood, then it would seem rational that, by removing sixteen or twenty ounces of such blood, we have relieved the patient of a definite amount of the poison. Opponents of the method, however, claim that we leave the rest of the toxins in the patient's body in greater concentration and that venesection causes cardiac depression, a sudden fall of blood pressure, with shock and general and cerebral anemia. The method appeals to most of us as a definite means of reducing the blood pressure and it is the general custom to remove sixteen or twenty ounces or until the blood pressure is reduced to 150 mm. Further reduction than this is always cautioned against, because the delivery of the patient and the natural loss of blood incident to that would reduce the blood pressure considerably and might lead to collapse.

Williams, who has always been an advocate of venesection in eclampsia, even if the pulse was weak and thready, in the latest edition of his textbook advocates the removal of 1000 c.c. of blood or until the blood pressure is at 100 mm., as he claims it must be done in considerable amount to be effective. It would seem that a quart of blood is an unusually large amount to remove from a patient unless experience has taught one that air hunger and edema of the lungs will not follow and that, if delivery occurs shortly after, there will be a correspondingly small blood loss. Beck reports the use of a large early phlebotomy, as much as 1000 c.c., in the treatment of 17 cases of eclampsia, with one maternal death, at the Long Island Hospital.

The practice there seems to be a general one, the only guide being a fall of the blood pressure to 100 or an irregularity of the pulse. The weight of the patient, the blood pressure and the general vitality should be the determining factors as to the safety of the withdrawal of so large a volume of blood. This feature consequently deserves very earnest consideration.

The introduction of normal saline, Fischer's or Ringer's solution into the vein after the venesection is next for consideration. As it is

claimed that there is a chloride retention in the system in eclampsia, it would apparently be absurd to add to the burden by instilling normal saline, and the other solutions are in the same class. Fortunately we can discard all of these as we have in 10 per cent glucose solution, introduced in quantities of 500 c.c. intravenously, an equally efficient diuretic and a readily assimilable carbohydrate, but also, according to Titus and Givens, a substance that rehabilitates the liver cells destroyed by the toxemia.

What causes the edema of the lungs that we find at the end of our fatal cases? When *veratrum viride* was used, we blamed the depressing action of this powerful drug for the condition; when venesection became the rule, we ascribed it to the sudden fall in blood pressure; when we used the morphine treatment, the same edema confronted us even when we used atropin to try to ward it off.

What part does the aspiration of frothy mucus play in the production of pulmonary complications, especially in the neglected cases that come in the hospitals hours after the first convulsions?

In a consideration of the various conservative treatments, we are confronted with at least four methods, the use of *veratrum viride*, the Stroganoff, the McPherson and the Rotunda procedures.

The treatment by *veratrum viride* cannot be ignored as it still has many active adherents. In answer to a questionnaire sent out by the *Therapeutic Gazette* last year three out of six teachers of obstetrics in prominent universities advocated *veratrum viride* in the treatment of eclampsia. Gillespie of Cincinnati is perhaps the most ardent supporter of the treatment today and he follows in the footsteps of worthy predecessors, Reamy and Isham. Zinke, also of Cincinnati, was an enthusiast upon the subject. As Gillespie states, this drug has been maligned by several classes of practitioners. Those with craven souls, who dare not try agents possessed of positive therapeutic effects, are not expected to try it. In antepartum eclampsia he directs that 60 min. of veratrone, a standardized preparation of *veratrum*, be given hypodermically at once, followed by 15 min. every ten minutes until there is sighing respiration, copious bilious vomiting and a soft pulse of 60, 50 or 40. The vomiting should be free for two hours. Neither Zinke nor any of the others advocate it in such heroic dosage. One writer in fact uses morphine in connection with *veratrum*, although that drug practically is the antidote to an excessive action of the latter.

It should be significant, that *veratrum* has been used at one time or other by every prominent obstetrician, only to be discarded. Probably, it was not used in sufficient dosage; at any rate, anyone intending to use this drastic remedy should seek an opportunity to see its use in experienced hands before experimenting with the drug.

To Stroganoff of Russia, belongs the credit of having brought to the notice of the profession the first definite plan for a conservative treatment of eclampsia. Reporting at one time 800 eclampsias with as low a maternal mortality as 8 per cent, his latest statistics are even better and in a considerable number of cases conducted by himself, there has been no mortality. In spite of such favorable reports, the method does not seem to have met with great favor in this country and reports upon its use indicate that the same results have not been duplicated here. The treatment depends practically upon continuous narcosis induced with morphine and chloral, with an occasional venesection for high blood pressure and Stroganoff insists that it should be carried out strictly according to his directions. His instructions are as follows: (1) Isolation of the patient in a darkened quiet room. (2) Careful attention to the respiratory process, cleaning the mouth, throat and nose after fits, keeping the patient lying on her side, fresh air and if marked cyanosis, oxygen. (3) Morphine subcutaneously and chloral *per rectum* in alternate doses and at stated times until fits are controlled as follows,— $\frac{1}{4}$  gr. of morphine when first seeing the patient, one hour later 30 grains of chloral, three hours later morphine gr.  $\frac{1}{4}$ . Seven hours later chloral 30 gr., thirteen hours later chloral 20 grains, twenty-one hours later chloral 20 grains. (4) Twenty-five ounces of milk a day and the same amount of saline *per rectum* or by the mouth; no other food.

Chloroform is given for the convulsions and if there are more than three convulsive seizures, then 400 c.c. of blood are removed by venesection. No attempt at delivery is practiced unless there is full dilatation of the cervix.

In the last few years, Ross McPherson has reported a series of cases of eclampsia with 9 per cent maternal mortality, claiming to have followed the Rotunda method in the treatment, but his description does not coincide with the method used in Dublin at the present day. It follows rather closely the Stroganoff treatment but depends entirely upon morphine for the narcosis. Chloral is not used, presumably from the general fear of the toxic action of the drug. He directs the treatment as follows:

“Immediately upon entrance to the hospital the patient’s blood pressure is taken, a catheterized specimen of urine is secured and she is put into an isolation room, which is darkened and as much quiet as possible obtained. She is then given  $\frac{1}{2}$  grain morphine by hypodermic, the stomach is washed out and two ounces of castor oil poured down the tube at the end of the lavage. A colonic irrigation of five gallons of 5 per cent glucose solution is then given.

If the blood pressure is over 175 mm., venesection is done to bring the pressure down to 150, normal saline is not injected. The patient is now kept quiet and  $\frac{1}{4}$  grain of morphine administered every hour until the respirations drop to

eight a minute. At this time convulsions have usually ceased, the patient will have fallen into labor and will be delivered normally or by an easy low forceps in a short time.

We practiced the McPherson method rather faithfully in our hospital for two years but were very much disappointed with the results, as we had a high maternal mortality, the morphine tending to check elimination by the bowels and producing pulmonary complications, especially edema of the lungs, in spite of using atropin in conjunction with it. We found that the morphine did not benumb the sensibilities sufficiently and our manipulations incited convulsions. Although kidney secretion seemed to improve with the administration of the morphine, elimination by the intestines was interfered with and in our experience those cases of eclampsia have always shown the most satisfactory improvement, that had free evacuations from the bowels.

The Rotunda method as now practiced by Hastings Tweedy of Dublin, who according to late reports has had 29 serious cases without a death, depends entirely upon starvation, elimination and close observation of the patient, and may be briefly summarized as follows:

Morphine is no longer used in the course of the treatment, because it is likely to cause respiratory complications and delay excretion, while it does not control the fits.

For the convulsions, the patient is placed on the side with a gag in the mouth. If there is delay in respiration after an attack then pressure is made upon the chest.

The stomach is washed out with a gallon of sodium bicarbonate solution one dram to the pint and at the end a pint of the solution with four ounces of Mist. Senna Comp. or three ounces of castor oil is left in the stomach.

Lavage of the colon is then practiced with a No. 24 stomach tube passed up 14 to 18 inches, first using two or three pints of soapy water, then four or five gallons of sodium bicarbonate solution, two pints of the solution with four ounces of purgative being run in at the end. The colon irrigation is to be repeated every five or six hours.

After the patient can take fluids by the mouth purgatives are given every six or eight hours until the toxemia disappears. In the meantime the patient receives nothing but water until there is a copious secretion of urine.

If there is little or no edema, bloody urine and profound coma, then in addition, 40 ounces of sodium bicarbonate solution are instilled under the breasts and this is repeated every six to twelve hours. No attempt is made to hasten delivery but when the head is felt in the vagina and is not expelled naturally then forceps are used.

In order to gradually arrive at some satisfactory solution of the treatment of eclampsia, our obstetric staff agreed upon a definite plan to be followed in all cases, the results to be studied at the end of the year in order that as the result of our own experience and with any new advances brought out in the literature, we may gradually achieve something definite in the treatment of this dread disorder. Accordingly the following schedule was devised:

## ROUTINE FOR ECLAMPSIA

## Under Nitrous Oxide Oxygen Anesthesia

1. Place the patient on the left side near the edge of the bed, with the head low, to allow secretions to drain out of the mouth.
2. Palpate the abdomen, locate fetal heart and take blood pressure.
3. Make vaginal examination to determine whether patient is advanced in labor.
4. Catheterize the bladder to secure specimen of urine for examination.
5. One half gallon soap suds enema followed by colon irrigation with four gallons 5 per cent sod. bicarb. sol. and when introducing the last pint add 2 oz. saturated magnesium sulphate solution.
6. Introduce the stomach tube, then stop anesthesia, practice lavage with 1 gallon sod. bicarb. solution, then leave 4 oz. magnesium sulphate solution in the stomach at the end of the lavage.
7. Place the patient in the electric blanket for twenty minutes.
8. If convulsions continue and blood pressure is above 150 mm., withdraw 500 c.c. of blood.
9. Introduce 500 c.c. of 10 per cent warmed sterile glucose solution into the vein of the other arm.
10. If the blood pressure is not high and in both instances if the convulsions continue and the patient is not ready for delivery, then give morphine gr.  $\frac{1}{4}$  hypodermically every three hours as needed to control the convulsions.
11. If the patient is advanced in labor then, under nitrous oxide oxygen anesthesia, expedite delivery with forceps or version.
12. If the patient arrives in coma, then all the above manipulations can be conducted without anesthesia.

This routine has been in practice in our hospital since January 1, 1924. Up to the present, we have had eleven eclampsias with two maternal and three fetal deaths, too small a number to lead to an opinion, but in our observation, an improvement over our former treatment.

## CONCLUSIONS

1. The eclampsia patient should be in a bright room, lying on the side with head low and near the edge of the bed, especial care being taken to prevent secretions from being aspirated into the lungs.
2. No anesthetics should be used during the convulsions, but nitrous oxide oxygen during the manipulations, to prevent them.
3. The hot wet pack, preferably with the electric blanket, should be used to secure relaxation and expedite delivery.
4. Venesection to the extent of 500 c.c. followed by the introduction of 500 c.c. of 10 per cent glucose solution, should be resorted to if the blood pressure is above 150 mm. and convulsions continue.
5. The Rotunda method offers the best results at present.
6. As eclampsias are always emergency procedures, every hospital should establish a definite routine, so that measures may be at once started by specially trained nurses and the house physician, awaiting the arrival of the staff.

7. Reports upon the results of such routines by the larger maternity hospitals should be sent to this association each year in order that something definite may be attained in the treatment of eclampsia.

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(For discussion see page 386.)

## TREATMENT OF ECLAMPSIA BY THE STROGANOFF METHOD

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THE writer has recently returned from Leningrad, Russia, where he visited Dr. V. V. Stroganoff, Professor of Obstetrics in the Government institute of Obstetrics and Gynecology. The purpose of this visit was to investigate the Stroganoff method of treatment of eclampsia. The findings were instructive and may prove of interest to obstetricians elsewhere.

Professor Preobraschensky, Director of the Institute, as well as Professor Stroganoff, were exceptionally courteous and cooperative. They instructed their various assistants of the clinic to do everything possible to make my task easy, and the whole staff of the institute cannot be thanked too highly for their kind cooperation.

Early in April, 1924, a meeting of the Obstetrical and Gynecological Society of Leningrad was called to discuss the problem of eclampsia. Some sixty obstetricians and gynecologists attended the meeting, and, after several addresses had been made, all who were present were strongly urged to send any case of eclampsia which might occur in their practice during the next few months to the clinic of Professor Stroganoff in order that his method of treatment might be demonstrated.

Although we were in constant touch with the different hospitals throughout the city, unfortunately no case of eclampsia was admitted during the six weeks of my visit, the last one treated in Stroganoff's Clinic being admitted February 27, 1924. Professor Stroganoff was, however, kind enough to give me the histories of several recent cases, as well as to put at my disposal his complete statistics for the period from 1897 to 1924. The information gathered from these histories and statistics, and from many discussions with Dr. Stroganoff,



as well as with other obstetricians in Leningrad, forms the basis of this report.

#### METHOD OF TREATMENT

The following is the method of treatment as outlined by Stroganoff.

1. Upon Admission: (a) Dark room with a minimum of noise. (b) Special nurse. (c) Examination or disturbance of patient only when absolutely necessary, and then usually under chloroform. (d) 0.015 (0.01—0.02) gram morphine hypodermically, while under chloroform narcosis;—usually about 10 to 15 grams of chloroform being employed.
2. One Hour After Admission.—2.0 (1.5—2.5) grams chloral hydrate per rectum with 100 c.c. normal salt solution and 100 c.c. milk. Should the patient be conscious the chloral hydrate can be administered by mouth with 100 c.c. milk. (Note:—Chloral hydrate is always administered without the use of chloroform, except where the patient has had one or more convulsions after admission; then about 10 grams of the anesthetic are used with each dose of chloral hydrate.)
3. Three Hours After Admission.—0.015 (0.01—0.02) gram morphine hypodermically under 10 to 15 grams chloroform.
4. Seven Hours After Admission.—2.0 (1.5—2.5) grams chloral hydrate, as above.
5. Thirteen Hours After Admission.—1.5 (1.0—2.0) grams chloral hydrate, as above.
6. Twenty-one Hours After Admission.—1.5 (1.0—2.0) grams chloral hydrate, as above.
7. After Each Convulsion.—Oxygen is administered as quickly as possible. This is kept up until the breathing improves, usually about 5 minutes.
8. After Three Convulsions in the Clinic.—Venesection of not more than 400 c.c. is resorted to.
9. In Case of Frequent Convulsions.—Chloroform and chloral hydrate to be used more energetically than outlined above.
10. No Convulsions for Thirty-four Hours.—If patient has been free from fits for twenty-four hours or longer after admission, and has not yet been delivered, she should be given about 0.5 grams chloral hydrate every eight hours for about three days.
11. Child.—Operative delivery is resorted to only when intervention becomes absolutely necessary for the sake of the child.

This method, which has just been outlined, is followed in all cases of eclampsia during labor. In antepartum eclampsia, the same procedure is used except that usually it is advisable to employ smaller quantities of the narcotics. Stroganoff believes that postpartum eclampsia is easier to treat and accordingly recommends the same treatment as in the mild type.

From the study of the histories put at my disposal in the Leningrad Clinic, it was clear that Professor Stroganoff conscientiously follows the treatment just described as closely as possible, and always adheres to its general principles.

#### STROGANOFF'S STATISTICS

In order to arrive at an unbiased opinion regarding the value of his method of treatment, Stroganoff's statistics which are based upon the following data, were analyzed. It should be noted that two sepa-

rate clinics are under the charge of Stroganoff, which are designated below as "A" and "B" respectively.

Between the years 1897 and 1924, 799 cases of eclampsia were observed in 77,315 patients admitted to the two services, or an incidence of one per cent, divided as follows:

Clinic "A"	55,757	662	1.2%
Clinic "B"	21,558	137	0.6%

Table I gives an analysis of the cases treated in Clinic A for the fifteen years ending in 1924, and shows a gross maternal mortality of 9.3 per cent and a fetal mortality of 18.0 per cent.

TABLE I

YEAR	ECLAMPTICS	MATERNAL DEATHS	FETAL DEATHS
1910	20	3	Figures not available
1911	40	6	
1912	30	4	
1913	19	6	
1914	35	4	
1915	29	0	
1916	7	0	1
1917	25	0	4
1918	30	1	5
1919	15	2	3
1920	8	0	0
1921	12	0	1
1922	23	1	5
1923	13	1	4
1924	6	1	2
1910-24	312	29	(1916-24) 25

In Clinic B during the same period 78 cases of eclampsia were treated with only a single maternal death. In other words, 30 deaths occurred in 390 cases of eclampsia treated in the two clinics during the period under consideration—a gross mortality of 7.7 per cent.

I believe that these figures are authentic and represent the lowest mortality on any large series of cases with which I am acquainted. Stroganoff, however, holds that they do not accurately represent what can be accomplished by his method, and contends that the results obtained during the first five years in Clinic A should not be included, as he regards them as occurring during a period of learning, in which his technic was not always rigorously followed.

Upon making such a deduction, the following figures are obtained:

		ECLAMPTICS	MATERNAL DEATHS
Clinic A	1915-1924	168	6
Clinic B	1910-1924	78	1

or a total of 246 cases of eclampsia with 7 deaths—a gross mortality of 2.84 per cent.

TABLE II

YEAR	CASE NO.	CONVULSIONS AT HOME	CONVULSIONS IN CLINIC BEFORE TREATMENT	CONVULSIONS IN CLINIC AFTER TREATMENT	MOTHER	CHILD
1916	1	0	1	0	Well	Well
1916	2	2	1	1	Well	Well
1916	3	8	1	2	Venesection 190 c.c. Well	Died
1916	4	0	1	0	Well	Well
1916	5	0	1	0	Well	Well
1916	6	0	1	1	Well	Well
1916	7	1	1	0	Well	Well
1917	8	0	1	2	Well	Well
1917	9	0	1	1	Well	Well
1917	10	5	1	3	Well	Well
1917	11	0	1	1	Forceps, Well	Well
1917	12	1	1	3	Venesection 200 c.c. Well	Well
1917	13	0	1	2	Well	Well
1917	14	0	1	0	Well	Well
1917	15	4	1	3	Well	Dead
1917	16	0	1	1	Well	On 31st day Dead
1917	17	0	1	0	Well	Well
1917	18	0	1	0	Well	Well
1917	19	0	1	0	Forceps, Well	Well
1917	20	0	1	0	Well	Well
1917	21	?	1	1	Well	Well
1917	22	3	1	3	Venesection 210 c.c. Well	Well
1917	23	0	1	0	Well	Well
1917	24	0	1	3	Well	Well
1917	25	0	1	0	P. P. Well	Well
1917	26	0	1	1	P. P. Well	Well
1917	27	3	1	1	Well	Dead
1917	28	0	1	0	Well	Well
1917	29	0	1	0	Well	Well
1917	30	4	1	9	Venesection ? Well	Dead
1917	31	5	1	0	Well	Well
1917	32	0	1	0	Well	Well
1918	33	0	1	0	Well	Well
1918	34	0	1	1	Nephritis, left before delivery	?
1918	35	0	1	0	P. P. 2 days 11 hrs. Well	Twins, Well
1918	36	0	1	0	P. P. Well	Well
1918	37	0	1	0	Well	Well
1918	38	0	1	2	Forceps, Well	Well
1918	39	?	1	1	Well	Well
1918	40	0	1	3	P. P. Well	Well
1918	41	0	1	0	P. P. Well	Well
1918	42	?	?	?	P. P. Well	Well
1918	43	?	?	?	P. P. Well	Well
1918	44	0	1	1	Well	
1918	45	0	1	1	Nephritic, Well	Twins, Well
1918	46	0	1	1	P. P. Well	Well

NOTE: In the above table, "P.P." denotes postpartum eclampsia.

TABLE II—CONT'D

YEAR	CASE NO.	CONVULSIONS AT HOME	CONVULSIONS IN CLINIC BEFORE TREATMENT	CONVULSIONS IN CLINIC AFTER TREATMENT	MOTHER	CHILD
1918	47	0	1	3	P. P. after 2 days Well	Well
1918	48	0	1	0	Well	Well
1918	49	0	1	0	Forceps, Well	Well
1918	50	2	1	0	Well	Well
1918	51	20	1	1	Vaginal Section Well	Dead
1918	52	0	1	1	Forceps, Well	Well
1918	53	6	0	0	Forceps, Well	Twins, both dead
1918	54	4	0	0	Forceps, Well	Well
1918	55	0	1	0	Forceps, Well	Well
1918	56	0	1	6	Forceps, Well	Well
1918	57	0	1	0	Forceps, Well	Well
1918	58	15	1	1	7th mo. Well	Dead
1918	59	2	0	0	Well	Well
1918	60	1	1	0	Forceps, Well	Well
1918	61	15	0	0	Cesarean section Dead	Dead
1918	62	0	1	1	Well	Well
1918	63	0	1	2	Well	Well
1918	64	0	1	1	Well	Twins, Well
1919	65	?	0	0	Forceps, Well	Well
1919	66	0	1	0	Well	Well
1919	67	28	1	4	Cesarean section Dead	Dead
1919	68	5	1	4	Well	Well
1919	69	0	1	1	Forceps, Well	Well
1919	70	0	1	3	Dead	Well
1919	71	5	1	2	Well	Well
1919	72	0	1	1	Well	Well
1919	73	0	1	0	Well	Well
1919	74	0	1	0	P. P. Well	Well
1919	75	0	1	5	P. P. Well	Well
1919	76	0	1	2	Well	Well
1919	77	0	1	0	Well	Dead
1919	78	13	1	2	Venesection, Well	Dead
1920	79	0	1	2	Forceps, Well	Well
1920	80	0	1	0	P. P. Well	Well
1920	81	0	1	0	P. P. Well	Well
1920	82	0	1	0	Forceps, Well	Well
1920	83	0	1	7	No venesection Well	Well
1920	84	0	1	3	Well	Well
1920	85	1	1	0	Well	Well
1920	86	0	1	5	Well	Well
1921	87	0	1	0	Nephritis, Well	Well
1921	88	0	1	1	P. P. Well	Well
1921	89	0	1	0	Well	Well
1921	90	0	1	7	Venesection, Well	Well
1921	91	0	1	1	Well	Well
1921	92	0	1	1	Well	Well
1921	93	0	2	0	Well	Well
1921	94	0	1	4	Forceps, Well	Well
1921	95	0	1	3	Well	Well
1921	96	4	0	0	P. P. Well	Twins, 1 dead

NOTE: In the above table, "P.P." denotes postpartum eclampsia.

TABLE II—CONT'D

YEAR	CASE NO.	CONVULSIONS AT HOME	CONVULSIONS IN CLINIC BEFORE TREATMENT	CONVULSIONS IN CLINIC AFTER TREATMENT	MOTHER	CHILD
1921	97	0	1	0	Well, P. P.	Well
1921	98	0	1	1	Forceps, Well	Well
1922	99	7	1	2	Well	Well
1922	100	0	1	9	Nephritic, Well	Well
1922	101	0	1	0	Well	Well
1922	102	0	1	3	Well	Well
1922	103	0	1	0	Well	Well
1922	104	0	1	0	Well	Dead after 2 days
1922	105	0	1	3	Well	Dead
1922	106	0	1	3	Forceps, Well	Well
1922	107	1	0	0	P. P. Well	Well
1922	108	5	0	0	P. P. 10th day Well	Well
1922	109	0	1	8	Venesection, Well	Dead
1922	110	0	1	0	Well	Well
1922	111	0	2	0	P. P. 4th day, Well	Well
1922	112	0	8	0	Hedonal, Well	Well
1922	113	0	1	0	Well	Well
1922	114	0	1	3	Well	Well
1922	115	4	1	4	Hedonal, Dead	Dead
1922	116	0	1	8	Well	Well
1922	117	0	1	0	P. P. 5th day, Well	Well
1922	118	2	0	0	Well	Well
1922	119	0	1	1	Well	Well
1922	120	8	1	11	Venesection 500 c.c. Well	Well
1922	121	6	1	2	Well	Dead
1923	122	0	1	0	Well	Well
1923	123	0	1	0	Well	Dead
1923	124	14	1	0	Well	Well
1923	125	9	2	2	Well	Dead
1923	126	0	2	0	Dead	Well
1923	127	0	1	0	P. P. Well	Well
1923	128	10	0	0	Well	Well
1923	129	0	1	0	Well	Well
1923	130	0	1	5	Well	Dead after 2 days
1923	131	0	1	0	Well	Dead after 4 days
1923	132	0	1	1	Well	Well
1923	133	4	1	0	Well	Well
1923	134	0	1	0	P. P. Well	Well
1924	135	0	1	0	Well	Well
1924	136	0	1	0	Well	Well
1924	137	4	0	2	Dead	Dead
1924	138	4	1	0	Nephritic, Well	Dead
1924	139	3	1	0	Well	Well
1924	140	0	1	0	P. P. Well	Well

NOTE: In the above table, "P.P." denotes postpartum eclampsia.

In my opinion however, if such a deduction is allowable for Clinic A, a similar one should be made for Clinic B, in which event the number of cases under consideration would be considerably diminished and

the mortality incidence correspondingly increased. Exact figures are not available for such a computation, but admitting that relatively the same number of cases should be deducted for five years (1910-1914), and also that the single death in Clinic B occurred after 1915, one would have 42 cases of eclampsia with one death, which, when added to the corrected figures for Clinic A, gives a total of 210 cases, with seven deaths, or a mortality of 3.3 per cent, which is surely the lowest on record, and several times less than that obtained in Dublin.

Professor Stroganoff lays great stress upon the number of convulsions which occur in the clinic after his treatment has been started; as he considers that it is only in this way that its power for good can be appreciated. Accordingly, he was kind enough to furnish more detailed information for the period from 1916 to 1924 for Clinic A, as shown in Table II, in which are given separately the number of convulsions occurring in the home and in the Clinic, both before and after treatment had been started.

From the data afforded by Table II, it is apparent that the eclamptic cases treated by Stroganoff were relatively mild as compared with those observed in other clinics. This statement is based upon two considerations. First, because an exceptionally large proportion of the patients had no convulsions at home, and only one convulsion in the clinic. Second, because only a relatively small proportion of patients had more than 5 convulsions in all. This was noted 25 times in the 140 cases included in the table, and analysis showed that 14 patients had from five to nine convulsions, 4, ten to fourteen convulsions, and 7, fifteen or more convulsions; while in the last group only two patients had twenty or more convulsions. Consequently it should be expected that his results would be superior to those obtained in services having large numbers of seriously ill eclamptics.

Furthermore, several cases of postpartum eclampsia are included in the series, in which the first convulsion did not occur until ten or more days after delivery. Consequently, the question arises as to whether they represent true eclampsia, and whether they should be included in the statistics. Finally, it is clear that a certain number of patients have been designated as eclamptic, when closer study of their history indicates that they were really suffering from chronic nephritis with convulsions.

Nevertheless, even after taking all of these factors into consideration, it is evident that Professor Stroganoff has obtained such unusually good results that in my opinion it becomes the duty of all conscientious obstetricians to bear them in mind, and to consider whether or not they cannot learn something from them.

After leaving Russia, I had an opportunity of visiting the important obstetrical clinics in Germany, Austria, France and the British Isles.

This enabled me to discuss the Stroganoff treatment of eclampsia with the leading obstetricians of Europe before meeting Professor Stroganoff in London as had been previously planned. The information gained from these clinics is especially valuable in view of the fact that Prof. Stroganoff had personally demonstrated his method in certain of them.

The Stroganoff method is fairly well known in Germany, whereas this cannot be said for the other countries in Europe. Yet, even in the German clinics, one finds a great deal of confusion regarding the method. This is perhaps best illustrated from the following translation of the "Eclamptic Journal" or history sheet, used in the clinic of Döderlein in Munich.

#### RULES FOR TREATING ECLAMPSIA

"1. As soon as possible after admission, a detailed history, especially as to temperature, pulse, lung examination, urinalysis (quantitative and qualitative), and blood pressure is taken, and an enema given.

"2. Obstetrical Therapy: The foregoing being done, termination of labor as soon as possible, otherwise waiting.

"3. Venesection of 500 c.c.

"4. When sedative treatment is necessary, the Stroganoff modification of Veit's method.

a. 0.015 gm. morphia subcutaneously.

b. 1 hour after the beginning of treatment, 2 gm. chloral hydrate.

c. 3 hours after beginning of treatment 0.015 gm. morphia.

d. 7 hours after beginning of treatment 2 gm. chloral hydrate.

e. 13 hours after beginning of treatment 1.5 gm. chloral hydrate.

f. 21 hours after beginning of treatment 1.5 gm. chloral hydrate.

(The chloral hydrate doses to be given in 300 gm. of milk or physiological salt solution.)

"5. In case the convulsions continue gastric lavage is to be used; after which the patient is to be given one liter of lemonade with sugar by stomach tube.

"6. Subcutaneously 0.5% solution  $\text{NaHCO}_3$  and 0.5%  $\text{NaCl}$ ; or 500 c.c. of Ringer's solution intravenously.

"7. Every two hours the patient is to be catheterized; the urine to be analyzed quantitatively and qualitatively. Should the patient become anuric, renal decapsulation is to be done.

"8. Should the convulsions continue further, a second venesection of 350 c.c. is to be done, to be followed by a third one of 250 c.c. if necessary.

"9. When anesthesia is employed, ether should be used, *no* chloroform."

I had the opportunity of seeing two cases of eclampsia treated in Döderlein's Clinic. Mid-forceps were used in both, and the patients were subjected to a great deal of handling and outside stimuli. Although sedatives as outlined by Stroganoff, are incorporated in the above schedule, the treatment is certainly not in accordance with his.

In Zangemeister's Clinic in Marburg, the Stroganoff method is also partially followed. The treatment here seemed to me superior to that

employed in Munich. Zangemeister carries out the idea of a dark room with absolute quietude. The patient is disturbed as little as possible, and morphia is used as a sedative; but the method is not strictly according to Stroganoff.

In general, one may say that the German obstetricians are not enthusiastic followers of the Stroganoff method, but, in fairness to Stroganoff, it should be stated that in no clinic has his method been given a fair trial.

In Paris one notes a great deal of indifference and some ignorance regarding the Stroganoff method. Couvelaire stated that he had not tried it, and he gave one the impression that he was waiting for some other clinic to demonstrate its efficacy.

In June of this year, Professor Stroganoff came to London to demonstrate his method of treatment. I met him there, as previously arranged, and together we visited the different clinics. In this way it was possible to hear his views on many subjects pertaining to eclampsia and its treatment. Although during the six weeks of our stay in London, he had no opportunity of definitely demonstrating his method to the British obstetricians, Professor Stroganoff gave several very interesting and instructive talks at the different clinics.

Summing up the information I have gained from Professor Stroganoff, both in Russia and in England, as well as what I saw in the different clinics in Europe, the following are the outstanding points with regard to the Stroganoff method of treating eclampsia.

1. About 70 per cent of Stroganoff's eclamptic patients had no convulsions before admission to his clinic and developed the condition only after admission; and of these 50 per cent had *only one* convulsion. It is my opinion that not all of these had true eclampsia; some were certainly nephritic toxemias with convulsions. Consequently, it is evident that Stroganoff deals with more mild cases of eclampsia than we.

2. Two-thirds of Stroganoff's maternal mortality occurs in patients who had four or more convulsions before admission to the clinic; and when we consider only those who had convulsions before admission, we find that the mortality was 9.3 per cent for the period 1916 to 1924.

3. The Stroganoff method has not been given a fair trial outside of Russia.

4. It is my belief even in the face of what has been said that there is a great deal of value in the method. Nearly all of the European clinics are agreed as to the use of morphia, while there is a divergence of opinion with regard to the other steps in the treatment.



## MODIFICATION OF THE STROGANOFF METHOD

There are two steps in the Stroganoff method which seem irrational to me; they are (a) the use of chloroform and (b) venesection to the amount of not more than 400 c.c. Chloroform when used in such small quantity as stipulated by Stroganoff certainly cannot produce a satisfactory narcosis, while our knowledge of chloroform poisoning strongly argues against its use.

I cannot help but think that the high blood pressure in eclampsia in many instances may represent a protective mechanism. Consequently, if a change in the semipermeability of the walls of the peripheral vessels plays a rôle in eclampsia, as I believe from experimental data which we are about to publish, it is safe to assume that the early and constant rise of the diastolic blood pressure is due to an increase in the peripheral resistance. If this state of affairs holds true, then a rise in blood pressure should facilitate osmosis and elimination. Additional evidence in support of such a view is afforded by the fact that there is such divergence of opinion as to the value of venesection in eclampsia, as well as by the fact that one often notices a remarkably sudden return of the blood pressure to its original high level after a venesection. Moreover, I cannot agree with Stroganoff in thinking that a venesection of 200 to 300 c.c. can be of any material value in the lowering of the blood pressure or in the elimination of "toxins," and I hold that either it should not be employed at all, or if it is, that large quantities of blood should be withdrawn (750 to 1000 c.c.).

In our clinic progressive improvement has followed the replacement of radical by conservative methods in the treatment of eclampsia, so much so that the mortality has been reduced by one-half, as may be noted in a paper by Karl M. Wilson, in the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY, February, 1925, p. 189. During the past ten years venesection, small doses of morphia and delivery only after complete spontaneous dilatation of the cervix have formed the basis of our treatment of eclampsia, but in view of what I was able to report concerning the results obtained by Stroganoff, Dr. Williams felt that we should give his method an extended trial with certain minor modifications, and I am appending the routine directions for the treatment of toxemic patients, which was put in force in this clinic, October 15, 1924.

It is, of course, too soon to predict what the results may be, but if we succeed in reducing our mortality to the level of Stroganoff, we shall feel that we have made a step forward, realizing, however, that any treatment at present is purely empirical, and must remain so until the actual cause of the disease has been discovered, after which a rational method of treatment may be evolved.

## TREATMENT OF PATIENTS WITH TOXEMIA OF PREGNANCY AT JOHNS HOPKINS

*Dispensary*

1. Patients must be sent into the hospital whenever they show:

- (a) Systolic pressure of 150 or more and ++ albumin.
- (b) Undue rise in diastolic pressure.
- (c) Any one of the above symptoms associated with severe headache, epigastric pain or pronounced edema.
- (d) Sudden amaurosis, even if none of the conditions mentioned above are present.

2. Patients with increasing blood pressure and definite trace of albumin must visit the dispensary twice a week. If they do not follow directions, Social Service must visit them *promptly*.

*Ward Service**Toxemias*

1. In moderately sick patients when the albumin does not fall to below 1 gram per liter within a week, or when the general condition is not satisfactory, the induction of labor should be seriously considered.

2. Very ill patients will probably have induction of labor sooner, immediate induction when amaurosis develops suddenly, either with or without epigastric pain. In nulliparae with a rigid cervix, cesarean section may be considered.

*Eclampsia*1. *Upon admission.*

Patients with frank eclampsia are:

- (a) To be placed in a quiet darkened room and to be disturbed as little as possible.
- (b) To have special nurse continuously until definitely out of coma.
- (c) To have  $\frac{1}{4}$  gr. morphia by hypodermic immediately.
- (d) To be catheterized, examined medically and obstetrically and bled for 200 c.c. under nitrous oxide anesthesia if conscious. The venesection is done only when it is necessary to obtain a blood specimen for research work.
- (e) To be placed on one side, with foot of bed elevated so long as coma persists. Mucus to be swabbed from pharynx as it collects.
- (f) To have water freely when conscious. If patient cannot drink on account of coma or lack of desire, the intravenous administration of 500 c.c. of 5 per cent glucose solution should be considered.
- (g) Not to be delivered until after cervix is fully dilated. Then by the simplest operative means, unless spontaneous delivery seems imminent.
- (h) No chloroform to be used.
- (i) Notify the chemical assistants as soon as patient is admitted, so that the necessary observations can be made.

2. *One hour after admission.*

If comatose give 2 grams chloral hydrate in 100 c.c. of normal salt solution, and the same quantity of milk per rectum. If conscious the chloral can be administered by mouth in 100 c.c. of milk.

3. *Three hours after admission.*

$\frac{1}{4}$  grain morphia hypodermically.

4. *Seven hours after admission.*

2 grams chloral hydrate as above.

5. *Thirteen hours after admission.*

1.5 grams chloral hydrate as above.

6. *Twenty-one hours after admission.*

1.5 grams chloral hydrate as above.

*General directions*

- (a) While eclamptic patients are under treatment, the assistants and nurses must insist upon the greatest possible quiet on the fifth floor.
- (b) Catharsis, sweating or venesection in excess of 200 c.c. must not be employed.
- (c) No change to be made in above schedule unless authorized by Drs. Williams or Stander.

(In operation from October 15, 1924.)

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## THE CONSERVATIVE TREATMENT OF ECLAMPSIA, WITH REPORT OF CASES\*

BY E. L. KING, M.D., F.A.C.S., NEW ORLEANS, LA.

(Assistant Professor of Clinical Obstetrics, Tulane University)

THE advocates of the conservative treatment of eclampsia have gradually been gaining ground at the expense of those inclined toward more radical measures, so that at present practically all the leading obstetricians of the world are in favor of the former plan of attack. The history of the development of Stroganoff's method and its various modifications is so well known that repetition is unnecessary.

Fitzgibbon, of the Rotunda Hospital, advocates free elimination without morphia, chloral, chloroform or venesection and reports 204 cases with a mortality of 10.75 per cent. Williams employs free venesection, withdrawing as much as 1,000 c.c., moderate doses of morphia, purgation and intravenous glucose infusions. He reports 115 cases with a total mortality of 14.8 per cent, 13 per cent in the antepartum and intrapartum varieties, and 21.7 per cent in the postpartum type.

Reports by other authorities bear these figures out, and it is apparent that the employment of the conservative method is followed by a maternal mortality appreciably lower than that following radical operative procedures. Relatively few obstetricians adhere to the Dublin method and the majority employ morphia more freely than either Williams or Stroganoff. DeLee is also opposed to heroic doses of morphia; he prefers to individualize his cases and leans toward the more active measures if the patient is in skilled hands and the infant is viable.

In New Orleans radical measures were preferred until quite recently. The methods employed varied with the stage of development of obstetric surgery so that we find 15 years ago accouchement forcé was the rule, to be succeeded by cesarean section (generally abdominal, rarely vaginal), which was the undisputed favorite until conservatism in-

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\*Read at a meeting of the New Orleans Gynecological and Obstetrical Society, December, 1924.

vaded the field. The latter procedure has been by no means discarded; it was popularized by the obstetricians and is still in high favor with the general surgeons. The results, however, have been far from satisfactory. Dicks, in reviewing the cases of eclampsia treated at Charity Hospital in the 15 year period from 1906 through 1921, found the maternal mortality to be 49 per cent. In studying the abdominal cesarean sections at the same institution from 1909 through 1921, I found 62 cases of eclampsia with 20 maternal deaths, a mortality of 32.26 per cent. The idea was firmly planted in our minds that because eclampsia was a complication of pregnancy the only way to treat it was to end the pregnancy as quickly as possible, so that the conversion to the conservative methods has been of slow evolution, in spite of the excellent results published in various reports.

This year we determined to give the newer method a real trial in the service of Dr. C. Jeff Miller at Charity Hospital, and while the short time at my disposal in the preparation of this paper did not permit a review of all our cases, I wish to report a few specimen cases, and can say for the whole series that the results have been extremely gratifying, for we have not lost a single mother from eclampsia during that time.

It is understood, of course, that we vary our method to meet the needs of the individual case, but in general our plan of treatment is as follows:

1. On admission, morphia gr.  $\frac{1}{2}$ . (Williams advocates gr.  $\frac{1}{4}$ , but I prefer the larger dose.)

2. Venesection, with withdrawal of 500-800 c.c. of blood. The blood pressure is carefully watched and the procedure discontinued at once if it falls to 130, as the chances are it will drop still further when the bleeding is stopped. If only a small amount has been withdrawn and convulsions are not checked the procedure is repeated. Williams bleeds if there is more than one convulsion, taking out 1,000 c.c., or less if the systolic pressure falls to 100.

3. As a rule, convulsions cease after this treatment. If they do not, morphia gr.  $\frac{1}{4}$  is given again as indicated. Williams does not use more than gr.  $\frac{1}{2}$  in 24 hours but I have employed a grain or more without deleterious effects. We sometimes employ also chloral hydrate or potassium bromide, or both, in large doses (30 to 60 grains of each by rectum every 4 to 6 hours as indicated). I have noticed that upon improvement the patients sometimes become violent and hard to control, a complication not encountered in handling cases by the radical method, and we have found that the administration of chloral and a bromide, or even another dose of morphia, meets the situation best.

4. After a period of rest a 5 gallon colonic flush of  $2\frac{1}{2}$  per cent solution of sodium bicarbonate solution is given. The stomach is

washed out if necessary and Epsom salts or castor oil, preferably the former, may be introduced through the tube. If gastric lavage is not employed, croton oil, 2 minims, is given on the base of the tongue.

5. Last of all we consider the termination of the pregnancy. If the patient is in labor, or if labor supervenes during the above procedures, we permit it to continue naturally. If it does not come on, we feel that it should be induced but not, as a rule, until convulsions have ceased and the patient's condition has improved. In one instance we deferred induction until 24 hours after the last convulsion and in another, our mildest case, with only one convulsion, labor was not induced until 10 days later, as I was trying to bring about sufficient improvement to justify an attempt to carry the patient to the stage of viability. This, however, could not be done.

CASE 1.—This patient, six and one-half months pregnant, was seen at the office on Thursday when her blood pressure was 128 systolic and her urine negative. Sunday afternoon, after a short prodromal period, she had a convulsion. Morphia gr.  $\frac{1}{2}$  was given and there were no further convulsions. The toxic condition persisted, however, with high blood pressure and albuminuria so that it was necessary to induce labor 10 days later. The baby weighed 3 pounds and was stillborn.

CASE 2.—This patient had three convulsions before admission at which time her systolic pressure was 150. Morphia gr.  $\frac{1}{6}$  was given at 9 A. M. She had 3 more convulsions at short intervals and 700 c.c. of blood was withdrawn. Scopolamin gr.  $\frac{1}{150}$  was given at 11:30 and morphia gr.  $\frac{1}{4}$  at 12:30. At 2 P. M. she had another convulsion and at 2:30 she was given an infusion of 1,000 c.c. of 5 per cent glucose solution. At 3:30 another quarter of a grain of morphia was administered and at 4 a bag was introduced under nitrous oxide and oxygen anesthesia. At 5 P. M. she had her eighth and last convulsion and at 9:50 she delivered a stillborn fetus which, with the placenta, weighed 4 $\frac{1}{2}$  pounds.

CASE 3.—This patient had five convulsions which were controlled by morphia gr.  $\frac{1}{2}$ , a venesection of 600 c.c. and an infusion of 500 c.c. of 5 per cent glucose solution. A bag was introduced 12 hours after admission and removed 26 hours later. Ten hours afterwards she delivered a macerated fetus weighing 3 pounds 10 ounces.

CASE 4.—This patient was admitted with a systolic pressure of 165. She had had nine convulsions before admission and had four more in the hospital. She was at term but the baby proved to be dead when she was first seen. She was given morphia gr.  $\frac{1}{2}$ ; venesection was done twice, removing a total of 1,000 c.c. of blood; glucose and saline solutions were given by infusion and chloral hydrate and potassium bromide were given by stomach tube. She was also given a dose of luminal sodium as her delirium was hard to control. Twenty-four hours after admission and 18 hours after the last convulsion a bag was introduced and the stillborn child delivered seven hours later.

CASE 5.—This patient was admitted in labor and delivered a dead baby shortly afterwards. She had two convulsions before and two after admission. She was given morphia gr.  $\frac{1}{2}$  and 600 c.c. of 5 per cent glucose solution intravenously, and 210 c.c. of blood were withdrawn.

CASE 6.—This patient was admitted with a diagnosis of preeclamptic toxemia and within 36 hours the toxemia had markedly increased and she was totally blind.

Shortly afterwards convulsions developed. Within 2 hours she was given morphia gr.  $\frac{3}{4}$  and 600 c.c. of blood was removed. She also had 60 grains each of chloral hydrate and potassium bromide by rectum. A bag was introduced and 1,000 c.c. of 5 per cent glucose solution given intravenously. She had eight convulsions in all, each milder than the preceding one. Morphia was given as indicated, a total of one grain in nine hours, and two doses of chloral and bromide by rectum. Irregular pains began next morning, but 59 hours after the introduction of the bag they were no stronger, the cervix was only slightly dilated, and her temperature was 102°. The bag was then removed. Twenty-four hours later, when the cervix was still only partially dilated and the pains were still slow and irregular, a larger bag was introduced. Delivery did not occur until the next day, four days after the introduction of the first bag. An almost complete anuria had developed, which improved after delivery, but she developed septicemia and died two weeks later. In this case the eclamptic seizures had ceased four days before delivery and the death was frankly due to sepsis. As far as I can ascertain from records, this the first fatal case of sepsis in many years originating in the hospital after vaginal delivery.

The cases I have quoted are typical of the others. Certainly these women were as ill as any we have handled in the past and the uniform success of our treatment has been most gratifying. The fetal mortality was 100 per cent, but two of the babies, the only full-term ones in the series, were dead on admission, and the other four were hopelessly premature.

The method to be employed in bringing about the termination of the pregnancy is our chief concern. If the patient is at or near term and not in labor I feel that the bag is best. It should not be introduced, however, until the convulsions have ceased and the patient's condition has improved. Labor generally supervenes in a few hours and delivery as a rule is readily effected, though version or forceps is sometimes indicated. On the other hand, the bag is not entirely satisfactory in pregnancies no further advanced than six and one-half or seven months. It is slow and uncertain in its action both in eclampsia and preeclamptic toxemia. In the four premature cases which I have reported, delivery followed the introduction of the bag in 6, 36, 48 and 96 hours respectively. In the last case the eclampsia was controlled and the death from sepsis was undoubtedly due to the repeated vaginal manipulations, though every aseptic precaution was apparently observed. It is rather difficult, as a rule, to terminate a pregnancy between the sixth and eighth months, and it is very trying on all concerned to have these patients complaining with ineffectual pains for hours and days before a premature, stillborn fetus is finally delivered. I have come to believe that in such a case vaginal cesarean section under gas or ethylene, after convulsions have ceased and the patient's condition has improved, will give better results.

In conclusion, I wish to emphasize that we must be radical in our conservatism; half-way measures invite failure. To employ morphia timidly, in doses of a sixth of a grain, and to remove little or no blood

is to court failure. The Rotunda method may be effective, but I prefer to see other reports on this treatment from other clinics before I shall feel justified in trying it on my patients.

NOTE: Since this paper was read, we have treated another patient successfully along the same lines. She had morphia, gr.  $1\frac{1}{4}$ , over a period of fourteen hours, two venesections of 500 c.c. and 400 c.c., respectively, one hour and fourteen hours after admission, and an infusion of 1,000 c.c. of 5 per cent glucose solution after the first venesection. A bag was introduced fifteen hours after admission, and a living baby was delivered by mid-forceps seventy-five hours later.

MAISON BLANCHE BUILDING.

(For discussion see page 412.)

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## THE MODIFIED SCANZONI MANEUVER IN THE TREATMENT OF VERTEX-OCCIPITO-POSTERIOR POSITIONS\*

BY ARTHUR H. BILL, M.D., CLEVELAND, OHIO

THE occipitoposterior position is without doubt the most important complication of obstetrics. Important, not in respect to the maternal mortality associated with its occurrence as compared to that of some of the more infrequent but more serious conditions of the mother, but on account of its extremely frequent occurrence; the apparent inability of a large percentage of physicians who practice obstetrics to properly manage such cases, the fetal morbidity and mortality and maternal morbidity as well as the unnecessary suffering and fatigue of the patient resulting from mismanagement. In the management of this complication the physician has fallen so far short of the possibilities of treatment that the posterior position still remains the most mismanaged obstetric condition. On account of the extreme frequency of this complication more damage has probably been done in the course of treatment than in all other obstetric complications put together. And yet it is a condition which may be easily met and the case handled to the utmost satisfaction and with excellent results if proper methods are used.

To one who has carefully made a diagnosis of presentation and position early in labor, it is apparent that the occipitoposterior position occurs far more frequently than the usual statistics would lead us to believe. For example, of my own cases 30 per cent have been occipitoposterior.

In many of these cases the head will rotate spontaneously to an anterior position, but in a large percentage of cases the rotation will

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occur only after hours of unnecessarily prolonged labor and in a considerable proportion of cases there will be either no rotation or the occiput will rotate posteriorly.

In this paper I am not concerned with that small group of cases in which, especially in multiparae, after full dilatation and rupture of the membranes the head rotates with the next pain or two. These will take care of themselves. However, altogether too much stress is laid upon the fact that spontaneous rotation commonly occurs and statements to this effect are used as an argument against the necessity or advisability of interference or assistance on the part of the obstetrician. Such arguments do not take into consideration the fact that rotation is usually associated with prolongation of the second stage of labor with the accompanying dangers, suffering and fatigue. To these dangers the patient is subjected unnecessarily for they may be avoided by the proper management of this complication.

This paper is presented to specialists, to obstetricians who are striving toward scientific advancement in their specialty, who are watchful for every means of relieving not merely those conditions which are associated with danger to the life of mother and child and with absolute obstruction to the passage of the presenting part, but also to simplifying labor to the extent of relieving the suffering of the patient, of allaying her fear of going through labor, and of reducing her fatigue to a minimum. To such it must be apparent that the occipitoposterior position is a distinct abnormality accountable for these unfortunate features and disasters of labor and that as an abnormality it should be corrected.

Does the fact that in a large percentage of posterior positions the head will eventually rotate, constitute a reason for allowing the labor to continue in the presence of such an abnormality, and a contra-indication to resorting to methods which will convert the abnormality into a normal condition? I would answer with a most emphatic no. At the meeting of this Association held two years ago, in a discussion of forceps rotation in occipitoposterior positions, the statement was made by one of our members that if I had performed this maneuver in several hundreds of cases I had done it unnecessarily, because his statistics showed that in most of these cases rotation would eventually occur. He also stated that the modified Scanzoni maneuver was a dangerous and difficult procedure, often associated with damage to the child's head and laceration of the vaginal wall.

These statements more than anything else prompted me to again speak on a subject which I have presented to this Association on at least two previous occasions.

Obstetric practice has changed very materially in recent years, and in some instances the changes in procedure have without doubt been



too radical. However, the general trend has been to make obstetric practice a more exact art and to get away from the former policy of indefinite watchful waiting, during which the physician did little or nothing for his patient. Every innovation has met with strong opposition and has been the subject of strenuous discussion as the minutes of this Association will show. However, many have been eventually adopted. Thus for several years these meetings furnished the occasion of bitter discussion of the advisability and even propriety of administering anesthesia during labor and yet what obstetrician is there present who does not at the present time administer anesthesia in labor?

While I do not agree with some of the more radical and revolutionary views advanced for the termination of labor, I am very firmly convinced that it is our duty as obstetricians to use all the skill which we possess in relieving our patients of the necessity of trying to overcome such an abnormality as the posterior position, which it may take them hours to overcome when we are able to correct that abnormality in a few minutes with safety for the mother and child. We must have realized long ago that most of the textbook indications for the termination of labor fell very far short of fulfilling the possibilities of first-class treatment. As a rule they consist of signs of danger to the life of the unborn child, signs of risk to the life of the mother, or utter fatigue; or absolute lack of advance of the head after a certain number of hours in the second stage of labor with no reference to or discrimination as to the cause of the lack of progress, but seldom is there reference to what we may call humanitarian reasons for interfering. However, aside from the question of humanity, prolonged labor in a case of occipitoposterior position must have a distinctly bad effect upon the mother, for extreme fatigue in labor not only carries with it its immediate dangers, but has a decided bearing on the convalescence of the patient, and prolonged pressure upon the head of the child may materially endanger its future development.

The writer believes very firmly in the correction of the posterior position early in the second stage of labor regardless of the fact that the head might rotate if the patient were allowed to continue in labor two or three or four or more hours longer. He believes that the obstetrician should do his part in such a labor and not expect his patient to do everything.

These statements are made with a full knowledge that a tremendous number of cases of occipitoposterior positions are greatly neglected.

The title of this paper is "The Modified Scanzoni Maneuver in the Treatment of Vertex-Occipito-Posterior Positions." However, I do not wish you to think that I consider this procedure the only proper way of handling such cases. There are in my opinion two approved

methods of terminating labor when the posterior position exists, namely podalic version and forceps rotation and delivery. Each has its proper place. My selection of these methods is about as follows: In all cases in which the head is in the pelvic cavity, forceps rotation is used. If the greatest diameter of the child's head has not passed through the pelvic brim there is a choice between version and forceps rotation, depending largely upon the tonicity of the uterus and the amount of water present, both of which depend upon the length of time which has elapsed since rupture of the membranes. Roughly speaking these procedures are used in about an equal number of cases when the station of the head is high.

In the group of cases in which forceps are to be used, the modified Scanzoni maneuver stands out above all others as the operation of choice. I know of no obstetric procedure which is more fascinating and which gives such uniformly excellent results. It is not a dangerous procedure as has been stated and not a difficult procedure. At the Cleveland Maternity Hospital all members of the Visiting Staff use this method and all of the Resident Obstetricians are taught to perform it. Failures in attempts to perform this maneuver or injuries to the child or birth-canal are all due to improper technic. I am firmly convinced of the fact that the reason why the modified Scanzoni maneuver is not more generally used is because the technic is not understood and hence I shall devote the remainder of my time to pointing out the most vital points in the proper technic and some of the crude and improper methods of using forceps in occipito-posterior positions.

I. Full dilatation of the cervix should be present before forceps are used. Efforts toward pulling a head through an undilated os and against a resistant cervix must be condemned.

II. No traction should be made while the head is in a posterior position or during the rotation. The method of drawing the head down to a lower pelvic plane before rotating is absurd. The reason the head does not descend spontaneously is because of the posterior position. There are many cases in which a rapid and almost precipitate birth would take place were a normal anterior position present, and yet in these same cases the head may remain at the pelvic brim in spite of very forcible pains. To drag such a head down in a posterior position requires force which is absolutely unjustified. If the head were rotated it would descend with practically no traction. Making traction and turning at the same time, thus producing a spiral movement, is responsible for the tears in the vaginal wall which have been held up as an argument against the Scanzoni procedure. The head should be rotated in the station in which it lies and no traction made before or during the rotation. This part of the ma-

neuver aims simply at correcting the abnormality and not at advance of the head.

III. An accurate cephalic application should always be made, as this prevents the possibility of the blades slipping during the rotation.

IV. Rotation should be made in such a way that the blades of the forceps shall remain in approximately the same axis. With the usual forceps which have a pelvic curve this may be accomplished only by making the handles of the forceps describe a large circle during the rotation. Failures in attempts at rotation are very often due to simply twisting the handles, which tends to make the tips of the blades deviate from their axes and describe a circle which of course they cannot do since such an attempt would only force the child's head against one side of the pelvis and rotation would not occur.

V. Rotation should be continued until the sagittal suture lies in the anteroposterior diameter of the pelvis and not merely to the oblique diameter. If rotation is carried only to the oblique diameter the head will very likely slip back to the posterior position before the reapplication of the forceps.

VI. After complete rotation and before the removal of the blades enough traction is made to fix the head in its new position. The blades are then removed and reapplied to the head which is now in a normal position.

VII. In the reapplication of the forceps the posterior blade should always be applied first to support the head and avoid the possibility of forcing it back into its original posterior position during the application of the anterior blade.

Success or failure of attempts to perform the modified Seanzoni maneuver depend entirely upon whether the obstetrician adheres strictly to these vital points in technic.

Rotation of the head manually, while a thoroughly scientific procedure in that it corrects the abnormality before traction is made, offers the objection that the head must be considerably displaced during the manipulation and also that there is greater danger of its slipping back to the posterior position before forceps are applied. The application of a volsellum forceps to the child's scalp to prevent backward rotation of the head after manual rotation seems a very crude and unnecessary procedure.

In conclusion, my plea is for correction of posterior positions early in the second stage of labor as one of our greatest means of simplifying labor. This may be done by podalic version and by forceps in the groups of cases especially suited to each procedure.

When forceps are used the modified Seanzoni maneuver is above all the procedure of choice.

## REPORT OF TWO CASES OF BICORNATE UTERUS WITH PREGNANCY—CESAREAN SECTION\*

BY ARTHUR T. JONES, M.D., PROVIDENCE, R. I.

CASES of bicornate uterus are not extremely rare. On the other hand they are not so common that we are seeing them often and undoubtedly there are many cases that escape detection and the diagnosis of bicornate uterus is often not made unless there is occasion to open the abdomen for some surgical condition.

The following two cases seemed to be of sufficient interest to warrant reporting. The first was reported at Albany in 1922, in a paper entitled "Malformations of the Uterus and Appendages, with a Report of Six Cases."<sup>6</sup>

Since reporting this case as a malformation the patient has been pregnant and delivered of a living child.

The full report of case number one is as follows:

Mrs. C. W., age thirty-four, white, married five years. Menstruation has been normal; had one miscarriage at two months. The patient had been delivered of a six and one-half months' fetus two weeks before she was seen by me in consultation. Four days before labor she had complained of pain in her left side and following her delivery had noticed the presence of a tumor in that side. Examination showed the presence of a large tumor in the left side of the abdomen and pelvis, apparently connected with the uterus. The latter seemed about normal size for a uterus that had evidently been pregnant and miscarried two weeks or so previously. A diagnosis of a left-sided ovarian cyst was made. At operation, April 10, 1920, which was twenty-six days after delivery, the tumor mass was found to be the left horn of a bicornate uterus and was the size of a coconut. A definite sulcus divided this horn from the right side. The latter was about the size of a normal uterus. The transverse colon was adherent to the fundus of the left horn and when separated it revealed an ulceration or perforation of the uterus from which a dark bloody fluid escaped. The perforation had been evidently sealed over by the transverse colon adhering to it. The entire left side of the uterus was removed along the dividing sulcus. The remaining incision into the uterus was closed in layers and the round ligament which was detached from this left horn was sewed to the left side of the remaining or right half of the uterus. The abdomen was closed and the patient made an uninterrupted recovery. Examination of the left half of the uterus, which was removed, showed the mucous membrane very dark, grumous looking and thrown into heavy folds. It was evident that the pregnancy had occurred in this horn which had failed to involute and the ulceration or perforation had occurred at the fundus, where Nature had evidently taken care of it. The pathologic examination showed an excess of fibroid tissue but nothing else abnormal.

The patient was examined August 4, 1922. Uterus seemed normal in size and freely movable. Slight thickening on left side in the broad ligament. Right appendage seems normal. Up to this date no pregnancy had occurred following

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operation. Patient was very anxious to have a child and was advised that if she became pregnant we would do a cesarean section. She was seen October 15, 1923, and was between two and three months' pregnant. On April 22, 1924 the head of the child was low in the pelvis. Cervix soft and taken up. Fetal movements active. After consultation it was deemed advisable to not wait until full term, but to do a cesarean section at eight months. This was done April 28, 1924. A high incision was made and a living healthy child delivered. Patient made an uninterrupted recovery and was discharged on the nineteenth day, well.

The second case was referred to me November 1, 1923, with the following history:

M. L., age twenty-one, white, married two years and five months. Menstruation began at thirteen years, every twenty-eight days, painful first day; duration two to three days, moderate amount. Condition unchanged since marriage. Her last menstruation was August 27, she being now two months' pregnant. Examination shows condition of double vagina, a septum running along entire length in midline with a small separate cervix in each canal. Uterus is somewhat enlarged, but unable to determine in which side pregnancy may be. Nineteen days following this examination we removed the vaginal septum, feeling that it would be a definite obstruction to labor and as we had not determined thus early that she should have a cesarean section. June 19, 1924 she was seen in consultation, about two weeks over her normal period of gestation. Cesarean decided upon. The following day, June 20, patient began with labor pains and was immediately taken to the hospital and operated upon. A high incision was made and pregnancy was found to be in the left side of the uterus. A living normal male child was delivered. Incision in uterus was closed in usual manner. Right side of uterus was somewhat larger than a normal nonpregnant uterus and was in the pelvis occupying so much space that it would have prevented any possibility of delivery of a living child through the pelvis. The patient made an uninterrupted recovery and was discharged well seventeen days following operation.

Both of these patients may become pregnant again and I see no reason for preventing the same, nor why they should not have a cesarean section again if they do become pregnant.

As the bicornate uterus or a double uterus is definitely an anatomic defect the condition is very apt to complicate labor. We may get a definite dystocia or a ruptured uterus.

From a careful review of the literature on pregnancy in bicornate and double uteri it would seem to the writer that when a diagnosis can be made before delivery or attempted delivery these cases should be delivered by cesarean section.

In the two cases I have reported I feel that we had our definite indications and that neither of these cases should have been allowed to attempt spontaneous delivery.

#### REFERENCES

- (1) *Progressive Medicine*, September, 1917, p. 155. (2) *Ibid.*, September, 1918, p. 183. (3) *Ibid.*, September, 1919, p. 701. (4) *Transactions of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons*, 1912, xxv, p. 41. (5) *Ibid.*, 1921, xxxiv, p. 276. (6) *Ibid.*, 1923, xxxvi, p. 111.

REPORT OF CASE OF A LARGE MUCOCELE OF THE CERVIX,  
FOLLOWING A SUPRAVAGINAL HYSTERECTOMY  
FOURTEEN YEARS PREVIOUSLY\*

BY FREDERICK A. CLELAND, B.A., M.B., TORONTO, CANADA

Mrs. J., age forty-eight was operated upon about fourteen years ago for leiomyomata of the uterus, at which time supravaginal hysterectomy, with removal of both tubes and both ovaries was performed. She presented no unusual symptoms until the spring of 1924, when she complained of fulness in the pelvis, frequency of urination and constipation. Examination discovered a large, smooth, cystic tumor, filling the true pelvis. The tumor was about the size of a fullterm fetal head, fixed but not tender. The patient did not know whether the ovaries had been re-



Fig. 1.

moved at the previous operation, and the surgeon who had performed the operation had died in the meantime and no history could be obtained.

Operation was advised and performed June 5th, 1924. Upon opening the abdomen, the tumor was found to be completely covered with peritoneum, fixed in the pelvis, and the round ligaments on either side attached to it. The peritoneum over the tumor was incised, the round ligaments on each side severed, the bladder separated anteriorly, and, after considerable difficulty, the tumor was

\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18-20, 1924.

shelled out from beneath the peritoneal covering. It was then discovered to be attached to the vagina. The vagina was opened into and cut across transversely and the tumor removed. The vaginal flaps were sutured in the midline and the round ligaments sewn to the stump, the raw surface covered with peritoneum and the abdomen closed in the usual manner. Both ovaries, both tubes and the body of the uterus had been removed at the previous operation. Patient made an uninterrupted recovery.

Macroscopic examination of specimen disclosed a grayish, red, pyriform, cystic tumor, measuring  $4\frac{1}{2}$  inches in length by  $3\frac{3}{4}$  inches at its greatest width. The vaginal portion of the cervix forms the smooth, whitish, convex base and measures  $3\frac{1}{2}$  inches in diameter. Small, delicate blood vessels can be seen coursing over this surface and in several places whitish elevations, which are apparently flattened out nabothian follicle remain. There is no patent external os but a puckering can be seen about its center, which is probably where the edges have become adherent. The vaginal wall is shown at one side of the base, as a small flap of tissue. Around the remaining portion it has been dissected off very close to the expanded cervix. The tumor tapers off from this wide base to a narrow apex of more thickened tissue, and it was to this apex that the round and infundibulopelvic ligaments had been attached at the previous operation. A small opening was made in the tumor and about 300 c.c. of clear mucogelatinous fluid was evacuated. This fluid was neutral in reaction to litmus and had a specific gravity of 1006. In order to mount this specimen, the cavity has been packed with cotton to preserve its contour.

*Microscopic.*—The section through the wall of the cyst shows laminated layers of fibrous and muscle tissue. These structures show considerable atrophy but have retained the original blood vessels which are thick-walled and muscular and appear relatively large for the thickness of the cyst wall. Throughout this stroma there is an entire lack of inflammatory reaction. On the inner surface is a lining membrane of flattened epithelium, only one layer in thickness, while on the outer surface there is a covering membrane of squamous epithelium several layers deep. No glandular tissue can be recognized associated with the inner layer of epithelium.

For the lack of a better name, I called this tumor in our program, a cystic degeneration of a cervical stump, but this scarcely describes it correctly. Oskar Klotz, Professor of Pathology at Toronto University, suggests calling it a mucocele of the cervix, which seems a better term. I have been unable to find in the literature anything similar to this specimen, and I trust it is sufficiently unusual to warrant my presenting it at this Association meeting.

131 BLOOR STREET WEST.

(For discussion see page 395.)

# THE RELATION OF EXTRANEOUS DISEASE AND SUBSEQUENT ORGANIC DEFECTS TO THE INCIDENCE OF ECLAMPSIA\*

BY J. STUART LAWRANCE, M.D., PHILADELPHIA, PA.

*(From the Obstetric Department of St. Mary's Hospital)*

PURSUANT to the idea that all the relevant gross clinical and statistical data concerning eclampsia have not been assembled, analyses have been made of various features, some of more, some of but little importance, but all, we believe, of interest in this, the most intriguing of symptom complexes. In this examination, we have sought to determine what relation there may be, if indeed there be any, between the incidence of previous and concurrent diseases, their subsequent pathology, and the incidence of eclampsia. In order that one may have the proper perspective, it is perhaps better to regard eclampsia as the terminal convulsive stage of a toxemia that has advanced through two stages, the mild and the severe, to the convulsive stage, rather than as a detached entity. The analysis is prepared from this standpoint. The incidence of notable previous diseases, their subsequent pathology, and of concurrent diseases, has been ascertained for each stage and for one entire series of pregnancies named our First Series, which serves as a control for comparison. Ever since Tweedy, and later Lichtenstein, pointed out the significance of intercurrent lesions, we have made special efforts to obtain exact and full records of each patient's previous medical history, often verifying statements by consulting members of the family and the family physician. We try by routine fortnightly examinations, carefully recorded, to obtain accurate knowledge of defective organs. The material consists of 1708 pregnancies arranged in two series that are identical in every respect except that the first series received weekly prenatal care, and the second series did not; and as a consequence, the second series contains nearly six times as many eclamptics as the first. The first series contains 907 pregnancies of all sorts; 280 of these became toxic, viz., mild stage 186, severe stage 89, convulsive stage (eclampsia) 5. The second series contains 801 pregnancies of all sorts, and 28 of the convulsive stage (eclampsia), the number of the mild and severe stages of this series is unknown.

Our material is presented in the accompanying tables.

Deductions from Table I.—(1) The number of individuals who had any diseases previous to pregnancy, increases from 35.6 per cent for the control, to 40.8 for the mild, 46 for the severe, and 72 for the

\*Read at a meeting of the Philadelphia Obstetrical Society, March 6, 1924.



TABLE I

INCIDENCE RATE OF DISEASES AND DEFECTS ORIGINATING PREVIOUS TO PREGNANCY, IN A TOTAL SERIES (FIRST SERIES) OF PREGNANCIES, AND IN THE THREE STAGES OF TOXEMIA, COMPARED

	CONTROL.		TOXEMIA					
	TOTAL PREGNANCIES		MILD STAGE		SEVERE STAGE		CONVULSIVE STAGE (ECLAMPSIA)	
	1st Series	Per Cent	1st Series	Per Cent	1st Series	Per Cent	1st & 2nd Series	Per Cent
	No.		No.		No.		No.	
Total Number	907		186		89		33	
Individuals having previous disease	323	35.6	76	40.8	41	46.	24	72.7
Individuals with no previous disease	584	64.38	110	59.1	48	53.9	2	6
Individuals with no data	0		0		0		7	21.2
A. Primary Diseases (notable)	131	14.4	76	40.4	41	46.	36	112.
General infections	44	4.4	25	13.4	10	11.3	22	68.75
Infectious diseases								
Local infections								
Respiratory infections and Trauma	87	9.5	51	27.4	31	34.8	14	42.4
B. Secondary defects								
Cardiac	58	6.3	29	15.5	11	12.3	9	28.
Gastrointestinal	30	3.3	11	5.9	7	7.75	10	31.1
Renal	44	4.4	9	4.8	22	24.7	8	25.
Respiratory	1	0	0	0	1	0	4	12.5
Miscellaneous	29	3.2	21	11.2	4	4.2	11	34.
Interruption Tendency	75	8.33					7	21.5
1st Series	907	100.	186	100.	89	100.	5	15.6
2nd Series	0	0	0	0	0	0	28	84.
Stupid	N.N.		91	71.	51	57.	16	50.
Moron	N.N.		0		0		4	12.5
Thyroid small	N.N.		77	60.	45	50.	21	63.

convulsive stage. The number of individuals who had no diseases, decreases from 64.3 per cent to 59 for the mild, 54 for the severe, and 6 for the eclampsia.

(2) The incidence rate of the primary diseases contracted previous to the onset of pregnancy steadily increases through the three stages of toxemia, from 14.4 per cent for the first series of total pregnancies to 112 per cent for eclampsia. The most notable of these diseases are the general infections: influenza, pneumonia and acute inflammatory rheumatism, in the order named. Second come the infectious diseases, and notably scarlet fever.

(3) Chronic organic defects, secondary as a rule to the primary diseases, and preceding pregnancy, appear to be factors of considerable importance in the incidence of eclampsia. It is interesting to observe that gastrointestinal functional defects are more frequently found preceding eclampsia than any other one defect, increasing from 3 per cent to 31 per cent. Second in frequency are the renal defects of all sorts: 4.4 in the controls, 25 per cent in eclampsia. Third are the cardiac defects, increasing from 6 per cent to 28 per cent. Various

miscellaneous defects, such as anemia, chronic tonsillitis, and endometritis increase from a rate of 3.2 per cent for the whole series to 34 per cent for eclampsia. A history of a previous tendency to the interruption of pregnancy increases from 8.3 to 21 per cent.

(4) The increase in the incidence rate of previous general infections and of secondary organic defects progresses as one examines in order, first, the rate for the total pregnancies, then that for the three stages of the toxemias. This increase is not by any mathematical progression, but there are two almost uniform phenomena: first, the incidence rate of all leaps from that for the total pregnancies to that for the mild stage, and remains as a rule steadily at this rate through the mild and severe stages; second, the rate makes a second leap when we enter the third or eclamptic stage. There are two exceptions to this phenomena: one, the rate of incidence of renal defects makes but one leap, and that in the severe stage; second, the rate for syphilis decreases.

(5) In a previous paper, the relation of stupidity, environment, etc., were examined, and need not be repeated; but it is interesting to note the rate for mental deficiency and morons, and the influence of a rigid prenatal supervision.

TABLE II

## CONCURRENT DISEASES

INCIDENCE RATE OF DISEASES AND DEFECTS ORIGINATING IN THE COURSE OF PREGNANCY AND OF THE TOXEMIAS

CLASS	CONTROL		TOXEMIA				ECLAMPSIA CONVULSIVE STAGE	
	TOTAL PREG. 1st Series		MILD STAGE 1st Series		SEVERE STAGE 1st Series		1st and 2nd Series	
Number	907		186		89		33	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
<b>A. Primary Diseases</b>								
Influenza	26	2.5	3	1.6	0	0	1	3
Respiratory	11	1.2	6	3.25	4	4	3	9
Syphilis	11	1.2	4	2.1	2	2.2	0	0
Toxemia	280		186		89		33	
<b>B. Secondary Defects</b>								
Cardiac	9	0.99	0	0	1	1.1	8	24
Anemia	27	2.97	9	4.8	8	9	9	27
Enteritis	30	3.3	8	4.3	10	11.2	2	6
Hepatitis at P.M.	0	0	0	0	2	2.25	3	9
Miscellaneous	27	2.97	23	12.3	7	6.8	20	60
Renal	112	12.3	84	45	25	28	24	72.7
Respiratory	0	0	0	0	0	0	9	27

Deductions from Table II.—Of the primary diseases originating in pregnancy, few were of sufficient frequency to merit separate recording, and most of these have an indifferent relation. Influenza has almost a similar rate throughout. Respiratory diseases, principally bron-

chitis, have for the control a rate of 1.2 per cent, and it steadily increases through the three stages of toxemia until in the eclamptic stage, it reaches 9 per cent. Syphilis, strange to say, while it has a greater rate in the toxemias than in the control, decreases in frequency as the severity of the toxemia increases, being *nil* in eclampsia.

Of the concurrent organic defects, it may be said that they appear as the result of the toxemia, except that of anemia and enteritis, both of which have a steady rise in rate. Many of the remaining defects were terminal stages and essential features of the toxemia. Of these, renal defects take the first place not only because the rate of incidence is higher in the control but because the increase in rate rises with the severity of the stage of toxemia, for starting in the control with a rate

#### SUPPLEMENTARY DATA CONCERNING THE CASES OF ECLAMPSIAS

Number of cases	33
Number of Individuals	31
1st Series (Clinic)	5
2nd Series (Nonservice and Emerg.)	28
Primipara	19
Multipara	14
Period of Seizure—	
In Pregnancy	20
In Labor	3
In Puerperium	10
Therapy:	
Conservative (Rotunda)	28
Radical (Cesarean)	5-4 within 1½ hrs. of 1st convulsion
Mortality	10-Pul. edema 5, asphyxia 2, cardiac failure 3
Conservative	7.25%
Radical	3.60%
Premature Labor	6
Postmortem Cesareans	2
Living children	0
Postmortem Version	1
Living child	0
N. partition of Urine determined	13 cases at time of seizure or within 24 hrs.; others not given
NH <sub>3</sub> coefficient 20%, or above,	2 cases
NH <sub>3</sub> coefficient 15%	1 case
NH <sub>3</sub> coefficient 5-10%	8 cases
NH <sub>3</sub> coefficient normal	2 cases
Blood Chemistry determinations	-Only those made at time of seizure or within 24 hrs.
Blood Sugar determined	9 cases
Blood Sugar decreased	6 cases
Blood Sugar increased	2 cases
Blood Sugar normal	1 case
Blood Urea determined	10 cases
Blood Urea increased	9 cases
Blood Urea decreased	1 case
Blood Uric acid determined	6 cases
Blood Uric acid increased	4 cases
Blood Uric acid normal	2 cases
Blood Creatinin determined	4 cases
Blood Creatinin normal	4 cases

of 12 per cent, it reaches a rate of 72 per cent in eclampsia. Respiratory defects, principally pulmonary edema, come next, with no appreciable rate in the control, and none in the first two stages, but as we would expect, suddenly advance in eclampsia to 27 per cent. Cardiac defects have a similar curve; occurring scarcely at all in the control, and not at all in the mild stage; they appear in the severe, with a rate of 1.1 per cent, and in eclampsia with a rate of 24 per cent. These concurrent cardiac defects are nearly all myocarditis. The clinical relation between myocarditis and pulmonary edema is shown to be very close. The rate for hepatitis (necrosis, fatty infiltration) is not the true rate, for we only classify cases as such when it has been proved at postmortem five necropsies were performed in 10 deaths, three in eclampsia, two in severe stage. (Ten deaths in eclampsia, two deaths in the severe stage.) All of the five showed necrosis and fatty infiltration of the liver; and in addition, one case showed an acute miliary tuberculosis, one a metastatic carcinoma.

#### SUMMARY

1. There is a close relation between the incidence of eclampsia and the incidence of disease contracted previous to pregnancy. I. The relation is a causal one. II. The diseases that appear to render a woman liable to eclampsia are the general infections, influenza, pneumonia, acute inflammatory rheumatism, scarlet fever, furunculosis, and typhoid.

2. Chronic organic defects contracted previous to pregnancy bear a very close relation to the incidence and to the mortality of eclampsia. I. The relation is a directly causative one. II. The organic defects originating previous to pregnancy that render a woman especially liable to eclampsia are in the order of their importance: (1) Functional defects of the intestinal apparatus; extremely varied. (2) Renal defects, notably nephritis. (3) Cardiac defects, notably myocarditis, enteritis and anemia.

3. There is no evidence of a relation between the incidence of eclampsia and the incidence of concurrent diseases, except in respect to bronchitis.

## THE ANTEPOSED UTERUS\*

By F. REDER, M.D., St. Louis, Mo.

THERE will always be an interest attached to a uterus responsible for pelvic symptoms on account of the selective treatment necessary for each individual case. A patient can only be given the best treatment when the gynecologist, familiar with the normal and abnormal conditions of the pelvis, makes a careful study of the existing lesion and selects the treatment which in his judgment will prove most beneficial.

The evolution of technical progress in gynecology has been so rapid since the aseptic era in surgery has minimized the dangers of abdominal operations, that the scalpel is virtually the master in gynecologic treatment today.

When, during the progress of an examination for pelvic symptoms, an anteposed uterus is discovered, attention to this organ as the offending agent is often dismissed and other sources for the trouble are sought. The reason is plain because a uterus in anteversion is the accepted normal position of that organ. It would seem rather difficult reasoning to ascribe a low sacral backache, pelvic drag and pelvic congestion—pelvic symptoms closely associated with a retroposed uterus—to an anteposed one. Yet I have found these pelvic symptoms in a number of cases in the presence of an anteposed uterus. From what symptomatic standpoint could this organ presumably in its normal position, be held culpable? The question is further complicated because the symptom of sacral backache is common in women who have borne children and in women who have not. Upon what grounds can the absence and presence of these symptoms be explained? An answer to this question would carry with itself a certain amount of doubt were it not for the relief obtained from palliative measures. Under the circumstance it would appear perfectly justifiable to disregard the position of the fundus to a certain extent at least in attempting to discover a cause for the backache and pelvic drag. We have all met with cases in our gynecologic examinations where there was a retroposed fundus with no symptoms, and perhaps expressed surprise at the absence of the classic symptoms, just as we would expect surprise at their presence in an anteposed fundus.

The uterus normally has a definite excursion range limited by the stability of the cervical supports, i.e., there are varying degrees of

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ascensus and descensus. This can be beautifully observed in the ballooned vagina of a patient in the Sims' position. If from certain causes, such as childbirth, a relaxed or lacerated genital tract, abdominal ptosis, habitual constipation, or malnutrition, these cervical supports suffered a loss of tone, the excursion normally permitted will eventually become exaggerated in proportion to the impoverished strength of these supports.

In contemplating a diagnosis attention must be centered on the relative position of the cervix in relation to the pelvic frame. It is the position of the cervix more than that of the fundus which will aid in arriving at an understanding of these troublesome pelvic symptoms. An anteposed uterus will invariably evidence a certain degree of descensus before beginning prolapse with rotation toward the pelvic outlet. If the patient is young, and in reasonably good health, the cervical supports may possess sufficient resisting power to prevent further descensus for a long time. This, however, would not cause an amelioration of the symptoms, the patient would still be complaining; she would, however, not be getting worse. In the course of time, unless the patient is relieved, quite a different picture will present itself when the uterus as a whole has descended into the bottom of the pelvis. This picture may perhaps be easier to diagnose, the condition however may be more difficult to cure.

How can an anteposed uterus in descensus produce the classical symptoms usually ascribed to a retroposed uterus? Inasmuch as sacral pain and backache may be caused by a uterus in descensus regardless of the position of the fundus, it must be inferred that the symptomatic factor can be recognized in the descensus by causing interference with the return of the venous blood. This is extremely plausible when the resultant pathology of the pelvic structures is taken into account. There is no doubt that after a certain period of an existing descensus, circulatory disturbances, particularly venous, must take place in the pelvic structures, producing morbid conditions. The ovarian and anastomosing veins as they run through the infundibulopelvic and broad ligaments are prime factors in causing an intumescence of these structures. Such a condition is brought about in a purely mechanical way and must be ascribed to a partial compression of the veins at a point where these vessels cross the posterior pelvic brim. In a state of weakened cervical supports these veins can usually be found full and distended in the portion of the pelvis lying below the brim.

The persistent increase of vascular pressure induced by the partial compression not only leads to an engorgement and to a swelling of the immediate pelvic structures by effusion of serum, but also excites tenderness and pain by weight and drag upon the nerves. In a gen-

eral pelvic engorgement the infundibulopelvic ligament and the sensitive parietal peritoneum are put decidedly on the stretch. Inasmuch as the uterosacral ligaments are prominent structures in the cervical support, it can be expected that the greatest tension would come from the posterior part of the pelvis at or near the attachments over the sacroiliac joint.

The inference must be clear that a descensus exists at the expense of pulling the parietal peritoneum and the blood vessels contained in it, thus putting these structures on a stretch from the brim of the pelvis downward. It is reasonable to assume that the subsequent stasis, which takes place below the point where the ovarian and anastomosing veins cross the pelvic brim must result in an engorgement of these vessels below this point. As a consequence the parietal peritoneum, which covers and forms a large part of the pelvic ligaments, suffers from unavoidable tension and, being extremely sensitive, causes the pain which may be ascribed to a uterus in descensus.

Is an anteposed uterus in descensus difficult to recognize? To the careful examiner recognition should not be difficult. If he is not misled by his disappointment in not finding a retroposed uterus responsible for the sacral backache and the bearing-down pains and will investigate the anteposed uterus and its supports more closely, he will undoubtedly discover here the causative factor for the pelvic symptoms. He will notice during his manipulation with the patient in the dorsal position that the cervix of the anteposed uterus occupies an extreme backward position toward the hollow of the sacrum in relation to the pelvis, and that the uterine excursions of ascensus and descensus are exceedingly wide. This free mobility should at once attract his attention. Being a well-informed gynecologist he will recognize in these abnormal excursions the potential cause for the symptoms. To confirm his diagnosis, if the patient can be examined in the standing posture, the examining finger will without difficulty reveal the descensus. If the patient is asked to cough, the condition will be demonstrated still more satisfactorily.

Can this descensus be accepted as the offending factor in the production of these pelvic symptoms? A verification can be readily reached by properly placed vaginal tampons, thus forcing the uterus as a whole well upward. If after forty-eight hours the symptoms and drag are relieved by this procedure the conclusion should be convincing that the descensus is the source of mischief.

What is the treatment for a clearly differentiated case of descensus producing pelvic symptoms? The importance of the proper treatment is difficult to overestimate. The indications are twofold. The first is to establish an ascensus as normal as is possible, and the second, to retain it. I may state without reserve that the surgical

correction of this lesion is the only measure that will prove curative. A Meigs ring pessary, or a Gehrung or even a Hodge will give temporary relief; however, these measures are only palliative and will not effect a cure. It must be borne in mind that in reality four organs are involved, namely: the vagina, uterus, bladder and rectum. A properly fitting pessary will support these organs and will for a time spare the woman many troublesome symptoms.

For a cure of this condition, however, we must look to an operative procedure and the one which has proved most beneficial is a suspension of the uterus according to the technic of Gilliam, or one of the modifications. I have been very favorably impressed with the modification of Dr. Ill. Other conditions might be present which may add an additional untoward element to the lesion, and indirectly cause an aggravation of the symptoms. A lacerated or relaxed perineum may be the cause of traction from above and should be corrected either by a perineorrhaphy alone or combined with a colporrhaphy.

A cervix laceration will often prove a focus of irritation and cause a uterine congestion or hyperplasia, which may eventually aggravate the descensus through superimposed weight. Such a cervix must be repaired. Another condition whose influence may malign a uterus in descensus is the loss of the retentive power of the abdomen. ptosis of the viscera. It is very important that an existing visceral prolapse receive adequate support.

The enumerated lesions deserve close attention as their individual correction will materially aid in the success of the suspension.

I am aware that unnecessary operations for the relief of this condition have been and no doubt will continue to be performed because the true nature of the lesion has not been clearly recognized. In most instances this must be attributed to an incomplete study of the case. Incomplete study will lead, as it has in the past, to numerous sins of commission in the way of unnecessary and useless operations.

UNIVERSITY CLUB BLDG.

*(For discussion see page 394.)*



## ECLAMPSIA IN A PATIENT WITH A DUPLEX UTERUS AND A SINGLE KIDNEY

By S. A. COSGROVE, M.D., AND E. G. WATERS, M.D.

(Visiting Obstetrician and Chief Resident Physician, respectively, Jersey City Hospital, Jersey City, N. J.)

THE following case presented many interesting, clinical and anatomic conditions. We have, therefore, deemed it of sufficient interest to warrant recording.

Mrs. D. Y., a white female, thirty-five years of age, Polish by birth, was admitted to the hospital on February 10, 1924, in deep coma. Her past history was entirely negative as regards illnesses, injuries, or operations; she had delivered normally two full-term infants; her menstrual history was normal; her last period commenced July 4, 1923. The husband stated that up to three weeks prior to admission the patient was perfectly well. From that time, however, she had had frequent and severe headaches and complained of visual disturbances.

On the evening of February 9, when her husband returned from his occupation, he found his wife unconscious. He called several physicians and finally a public ambulance. The ambulance surgeon found the patient in a deep stupor from which she could be roused, together with muscular twitchings and stertorous breathing. He advised removal to hospital, which was refused by the husband. During the night the patient had some four or five severe convulsions and upon the advice of several other physicians the husband permitted her removal to the hospital. Immediately after admission at 5 A. M. she had two marked convulsions, lasting several minutes, during which time she appeared pulseless; the pulse gradually returned but was very rapid and thready. Her blood pressure after such an attack was systolic 125 over diastolic 55.

Physical examination showed a well-developed, moderately obese woman of middle age in deep coma. Her pupils were contracted and reacted slightly to bright light. The heart sounds were weak and rapid, with a blowing, apical, systolic murmur. The lungs were resonant throughout and on auscultation numerous transmitted tracheal râles were heard. The liver edge was palpable. The abdomen showed an apparently full-term pregnancy, with uterus displaced to the right and apparently in a state of tonic contraction. The lower extremities were considerably edematous; the urine was acid in reaction, smoky in color, specific gravity 1032, contained a heavy coagulum of albumin and considerable acetone, together with numerous hyaline and granular casts and red blood cells, but no sugar nor diacetic acid.

Morphine and atropine were exhibited and a cleansing enema, followed by a copious high colonic irrigation, was given with good result.

Vaginal examination showed a moderately extensive, old, second degree laceration of the perineum, relaxed vagina, and a softened, partly retracted cervix with the external os dilated about one and one-half fingers. The presenting part could not be palpated, but the history of multiparity, the duration and fulminance of the eclampsia and the estimation of easy dilatability of the cervix, made it appear expedient to manually dilate the cervix and perform podalic version and extraction.

This procedure was undertaken. When a dilatation of about four fingers had been attained, the cervix tore through the right lateral fornix of the vagina, into the peritoneal cavity. Exploration through this rent then demonstrated the presence of two uterine bodies, a smaller one to the left, continuous with the cervix, easily manipulated, the larger to the right; the latter appeared to contain a fetus but no communication between its cavity and the vagina could be felt.

The patient was in severe shock and attempts were made by medication and intravenous infusion to cause reaction. Laparotomy was performed to control intraperitoneal bleeding and in the interest of a child which had been demonstrably living a few minutes before.

The patient died just as the right uterus was incised, and a dead fetus extracted. The internal organs of generation were then removed *en masse*.

The fetus, its placenta and membranes showed no anatomic variations. Following is the protocol of autopsy of the mother:

Body was that of an obese white female, 66 inches in height and weighing 160 pounds. Rigor mortis was marked with postmortem hypostasis distributed

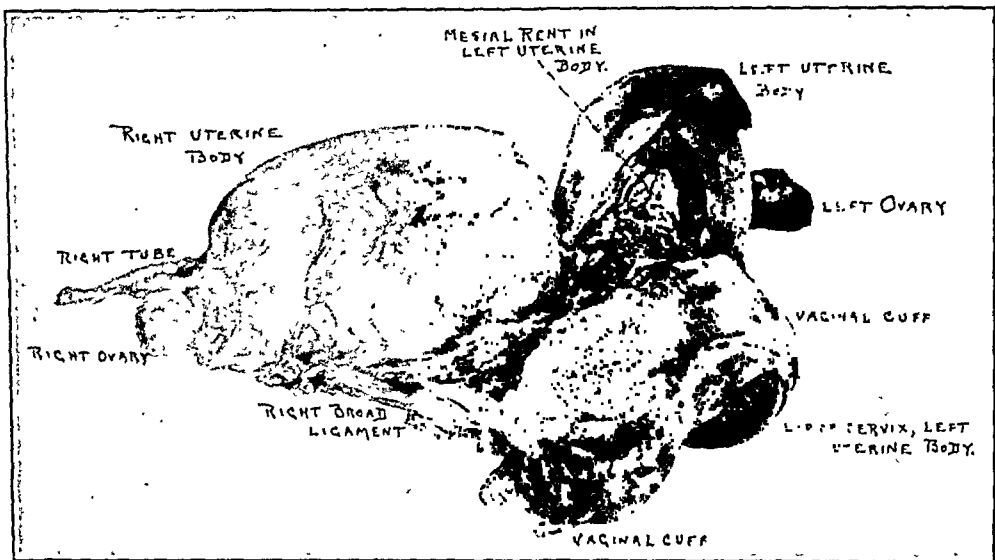


Fig. 1.—Showing both uteri before opening.

over the dependent portions of the body. Eyes, ears, nose and mouth, trunk and extremities showed no abnormality on inspection. The breasts were pendulous and contained colostrum. There was no superficial lymphadenopathy. The operative incision was extended to reach from symphysis to sternum. Several large blood coagula were in the pelvis.

The liver was smaller than might be expected. It was a dark yellow in color, showed some mottling and numerous diffusely scattered fairly large hemorrhagic areas. The tissue was soft and friable. The gall-bladder wall appeared smooth; the ducts and vessels were patent.

The spleen appeared of normal size and was rather soft and friable. The lymphoid tissue was not prominent.

The pancreas, stomach and intestines showed no naked eye changes.

The heart and lungs were removed through an incision in the diaphragm. Except for some dilatation of the right chambers of the heart, no other abnormalities were noted.

The right kidney and its accompanying adrenal were not found. Search for them in their usual position revealed simply a mass of adipose tissue. No ureter

was found on exploration of the retroperitoneal and pelvic region and examination of the blood vessels showed neither a renal artery nor vein, nor any vestige of aberrant vessels arising from the aorta at this level.

The left kidney and its accompanying adrenal were found in the usual position; both organs were much enlarged. The kidney showed an acute parenchymatous nephritis. It was removed with the ureter and bladder *in toto*. The ureter was found patent and entered the bladder in the usual manner. The bladder wall was smooth and the organ contained a minimal amount of urine. The urethral opening was in its normal position, but an orifice for a right ureter could not be found.

The interesting anomalies in the internal genitalia are best presented in the accompanying photograph. It will be noted that there were two distinct uteri; one of which (the left) communicated with a normally



Fig 2—Showing both uteri opened.

formed vagina; had a normal cervical canal and was in other respects perfectly normal. To it was attached a well-formed tube and ovary, the latter containing a corpus luteum of pregnancy. It was the cervix of this uterus which presented to the examining finger and was dilated manually until ruptured mesially. It was then noted that the fetus was not present in this uterus, but lay to the right of the uterus which presented in the vaginal canal. This led to the diagnosis of a double uterus and because no second cervical atrium presented, cesarean section was instituted, revealing an eight months' fetus in a uterine cavity lying to the right of the vaginally presenting uterus, with a tube and ovary attached. In the latter no corpora lutea were found. This uterine body appeared directly attached to the lower end of the body on the left, but presented no canal of exit. Sections of

the uterus in this region revealed no epithelialization or other evidences of a cervical canal.

The fetus in all respects was well formed.

Histologic sections of the kidney showed an acute parenchymatous degeneration and the liver showed an acute hepatitis with fatty degeneration, focal hemorrhages and necrosis. Section of the non-pregnant uterine endometrium showed a decidual reaction.

The pathologic diagnosis was: Acute yellow atrophy of the liver; eclampsia; acute parenchymatous nephritis; uterus didelphys; pregnancy; congenital absence of the right kidney and adrenal; operative wound of abdomen.

Anomalies of the female genital organs comprise a large and important group of the anomalies or maldevelopments found in the human race. Although practically all develop in embryonic life, little or no effect on the physiology of the individual is noted until late in post-natal life. In fact if the woman never marries or never becomes pregnant most of her genital anomalies are not discovered, or at most only accidentally revealed by operation.

The particular uterine anomaly found in this patient leads to an interesting discussion. Its occurrence has previously been reported and is well illustrated by a diagram in Aschoff's Pathology.<sup>1</sup> However, the unruptured, advanced pregnancy in a uterus without an outlet is unique. In this case the only theory which can be advanced is that the spermatozoon traveled through the left uterus into the left tube, and fertilized the ovum, which then passed transabdominally into the right tube and thus gained final lodgment in the aberrant uterus. This theory is further strengthened by the finding of a typical corpus luteum of pregnancy in the ovary on the left side, and by the fact that the patient had passed through two normal pregnancies on two previous occasions, which must have developed in the normally placed uterus.

The associated renal anomaly, though recorded, is one of the rarer anomalies of the kidney. What relationship, if any, it bears to the particular uterine anomaly under discussion is not definitely known, though Scheiber<sup>2</sup> in 1875, called attention to the frequent association of renal anomalies with those of the genital organs, and particularly with a bicornate uterus.

Josef Szymanowicz,<sup>3</sup> of Cracow, reported the case of a woman, twenty-one years of age, whom operation showed to have a double uterus, with rupture of the pregnant right horn. A postmortem examination showed that the connection between the two horns was muscular and had no lumen. The corpus luteum was in the left ovary; hence the ovum must have been impregnated there, and after external migration passed through the right tube into the blind rudimentary horn.

A second, somewhat similar, malformation was reported by Gottfried Eismayer.<sup>4</sup> A uterus unicornis with a rudimentary left lateral horn was found at autopsy. The right kidney was very large; the left kidney, with its ureter and vessels, was completely lacking. Eismayer comments on the occurrence of uterine malformations in aplasia of the kidney, and says defect of the left kidney predominates.

The cause of the eclampsia in this woman cannot be stated any more definitely than in any other case. She had passed through two successive pregnancies without ill effects, hence the absent kidney cannot be held accountable, though it is conceivable that the "organ reserve" had become spent in the course of her life, in one way or another. It is interesting to note that the patient did not menstruate during her pregnancy. Often menstruation continues in the non-pregnant uterus.

A recent case report of a didelphic uterus with an interesting discussion and bibliography is given by Francis C. Newton in the *Annals of Surgery*, January, 1924, xix, No. 1, p. 102.

We desire to thank Dr. A. V. St. George for the pathologic reports, and for the aid and advice he gave in the preparation of this paper.

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## FOREIGN PROTEINS AS ADJUVANTS IN THE TREATMENT OF OBSTINATE PELVIC INFECTIONS\*

By ROY W. MOHLER, M.D., PHILADELPHIA, PA.

*(From the Gynecological Department of the Jefferson Medical College Hospital)*

**N**ONSPECIFIC protein therapy is playing a rather large rôle in the treatment of many conditions. At this time we shall discuss only its use in the treatment of certain intractable inflammatory conditions of the pelvis, in which we have used milk either boiled or sterilized. Since the second case we have used only boiled milk. Nonspecific protein therapy has its beginning in the empirical use of preparations that were known to be of therapeutic value although the reaction of which was not understood. It is only within recent years that a thorough study of these preparations and their mode of action has been undertaken. For the references and the data on the subject matter of this paper we are indebted to Petersen, who has written a very excellent book on the subject and who has included in the bibliography all references to this form of treatment. The current literature contains very few references and there has appeared so far only one article concerning its use in pelvic inflammatory conditions, that by Gellhorn of St. Louis. Many different substances have been used to produce the same result, among which are counterirritants, blood and sera, both immunizing and normal, protein and nonprotein split products, enzymes, tissue extracts, vaccines, bacterial extracts and related products, yeast and irradiation.

The parenteral use of milk was introduced by Schmidt and Saxl in 1916 to induce a protein reaction, i.e., the typical rise in temperature observed following the use of other preparations. Milk offered the advantage that it was easily available and easily prepared. Ordinary market milk is boiled in an instrument sterilizer for five or ten minutes and from five to ten mils are injected intramuscularly, the site of injection being two inches below the crest of the ilium in the posterior axillary line. The injection is frequently followed by a chill and a rise in temperature that reaches its maximum in from six to eight hours and subsides usually within twenty-four hours. There is a well marked leucocytosis, increased pain in the region of infection, restlessness and increased pulse rate; the condition of the patient seems generally much worse. After twenty-four hours the pain subsides, the temperature drops to normal or nearly normal, the white cell count

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\*Read at a meeting of the Philadelphia Obstetrical Society, March 6, 1924.

again returns to normal and the patient has a sense of well being that has not been experienced for some time.

The indications for this treatment include acute infections with pain and tenderness in the region of the adnexa with no palpable enlargement; infections with palpable enlargement of the adnexa; patients with large collections of pus in the pelvis who are waiting for operation and whose general condition will not permit an operation. In the acute infection with pain and tenderness of the adnexa without enlargement there results cellular stimulation and alteration in the permeability of the cells. The former finds expression in increased secretory activity of the gland cells, increased activity of the muscles, increased activity of the leucocytes and the permeability of the cell membrane changes. First there is an increase in the permeability of the capillaries which is evidenced by augmented lymph flow and blood concentration. The permeability of the tissue cells is increased with a resulting outpouring of enzymes, of fibrinogen and of prothrombin, of immune bodies and other bodies which enable the system to overcome infection. These injections are used until all signs of the pelvic infection are gone and the patient feels no indication of her former trouble at the time of her menstruation. This is usually observed after four or five injections; sometimes a few more are needed. The injections are given at intervals of from five to seven days and the patients are warned of the conditions that will develop on account of the treatment. In the typical case the reaction becomes progressively worse until the third or fourth has been given, after which time it becomes less severe. While using this form of treatment all other means of expectant treatment should be continued, such as rest in bed, light diet, abstinence from sexual excitement and avoidance of other influences which would tend to exaggerate the condition. If a mass has developed in the pelvis the evident reaction is about the same as if the mass were not present but what actually occurs is some different. There is coincident with the inflammatory reaction an increase in the enzymes and the antibodies, and if the patient has been immunized or if the infection has existed for some time there is an increase in the leucocytes. The enzyme, the antibody and the leucocytic alteration exert an influence on the infecting body and aid in the digestion, the detoxication and the removal of the necrotic material. There is at first, however, a transient increase of intoxication which will subside completely after the proteins have been further split by the enzyme action. The well-being and the improvement of the patient are induced by at least three factors, viz., the destruction of the toxic material at the focus after the primary increase in the digestive activity, lessened susceptibility of the cells to intoxication, and finally an actual protoplasmic stimulation, partly from the nonspecific or the

specific injected, partly from the toxic material liberated from the inflammatory focus.

We have treated so far ten patients with milk injections and the results seem to have warranted the treatment. There were five cases with salpingitis without any general pelvic infection, all complaining of pain and tenderness in the affected area, two patients with pelvic peritonitis which had produced large pelvic masses with severe pain and tenderness in this region, one case of bilateral salpingitis complicated with pulmonary tuberculosis, one case with a cystic ovary following a salpingectomy on the affected side, another patient with a myomatous uterus with a pelvic mass of inflammatory origin which extended to the umbilicus.

All these patients were given five or six injections of milk at weekly intervals, the milk being boiled for ten minutes in an instrument sterilizer and then allowed to cool, the reactions for the most part were those described and almost typical in every instance. In all the patients there was a very marked improvement in the general condition, the pain became less, they gained in weight, the appetite improved, and the secondary anemia improved. There were no patients with marked anatomic lesions who were improved to the extent that these lesions could not be recognized. There are three cases which will deserve a little more detailed report.

A. G., admitted to Dr. Anspach's service Nov. 8, 1922. The pelvic examination showed large adnexal masses involving both sides, uterus fixed, with very marked pain and tenderness. Following each examination there was a rise in temperature. Patient did not respond at all to the routine expectant treatment, and after several months she was given two blood transfusions in hopes that her resistance might be built up to the point where an operation might be undertaken. On Jan. 15, 1923, her blood count was 65 per cent hb, 3,600,000, r. b. c., 11,000, w. b. c. On this date she was given 420 mls of blood by the Unger method. There was no change in her condition and a week later she was again given 420 mls of blood by the Unger method. She had a marked reaction following this transfusion and a week following this her blood count had gone down to 59 per cent hb, 3,000,000 r. b. c., 8,500 w. b. c. Her condition remained unchanged until February 19, 1923, at which time we began giving her milk injections. The first three were of sterilized milk of 5 mls, 8 mls and 8 mls respectively at six day intervals. The reaction following these doses was not very marked. On March 9th, 1923, she was given 8 mls of boiled milk, with a very marked reaction, and two subsequent doses at intervals of six days with very good reactions. On March 30, 1923, her anemia had improved, the blood count showing 74 per cent hb, 4,100,000 r. b. c. and 8,200 w. b. c. At this time the patient was feeling much better, had no pain in her lower abdomen, could be examined without having a rise in temperature. The pelvic examination by Dr. Anspach on April 14, 1923, showed adnexal mass much smaller, with marked induration of both broad ligaments, evidently a cellulitis. This patient reports now that she is perfectly well but there are, however, signs in her pelvis of very marked involvement at one time and although symptomatically well, she is not cured.

The next patient was a colored woman aged forty-one, in whom pelvic examination showed a dense mass filling the pelvis, fixed and very tender, particularly on



the right side, extending well up to the umbilicus. After having been in the ward for six weeks with no improvement in her condition, her blood count at this time being 47 per cent hb, 4,220,000 r. b. c., 8,400 w. b. c., she was given six injections of boiled milk, the first dose 5 mls, the second dose 8 mls, and all others ten mls, at intervals of one week. There was a reaction following all injections, her condition improved throughout the treatment and when the last dose of milk was given her anemia had improved to 69 per cent hb, 4,700,000 r. b. c. The examination of Dr. Anspach at the end of the treatment showed the uterus slightly enlarged, normal position, right and left adnexa enlarged, surrounding exudate much less and surrounding parts easily outlined. This patient when last seen a few days ago was symptomatically well but there was, however, still in the pelvis a mass which seemed to be a myoma.

The other case is a colored patient, aged twenty-six years, admitted to the hospital on October 20, 1923. Pelvic examination showed the uterus pushed forward by a large mass in the pouch of Douglas and extending laterally and involving both adnexa. On admission her blood count was 72 per cent hb, 4,400,000 r. b. c., 21,000 w. b. c. On Nov. 6th, 1923, she was given 5 mls of milk with a marked reaction; on Nov. 14th, she was given 8 mls of milk and subsequently 10 mls at 6 day intervals for four doses. Each injection gave a rather marked reaction, and her condition improved gradually until discharged from the hospital on Dec. 18th, 1923. On discharge the pelvic examination showed uterus about normal in size, fair mobility, adnexal enlargement much less, less tenderness and less fixation. Her blood count at this time was 82 per cent hb, 4,700,000 r. b. c., with a normal leucocyte count.

In conclusion we should say that this treatment makes the patient feel better. It will improve her general condition to the point where surgery may be undertaken with a minimum risk and some patients will need no further treatment.

1731 PINE STREET.

*(For discussion see page 411.)*

# UTERUS SEPTUS WITH SPECIAL REFERENCE TO OPERATIVE TECHNIC\*

BY WILLIAM KERWIN, M.D., F.A.C.S., ST. LOUIS, MO.

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UTERUS septus, a curiously interesting but not a rare condition, becomes a pathologic entity only when a more or less physiologic function is in progress, such as menstruation or pregnancy. By far the greatest number of cases are discovered because of some irregularity in the termination of pregnancy, for few cases give symptoms until this time, or such symptoms are not attributed to a developmental defect.

Strassman<sup>1</sup> collected one hundred cases from the literature up to 1904. He classified these cases so as to show the complications arising from pregnancy in these abnormal uteri as follows: four were operated; seven were sterile; five prevented from becoming pregnant; twenty-six came in for miscarriage; ten had twins; five cases, necessary to divide the septum because of obstruction to passage of the child; two cases, uterus ruptured; one case, cesarean section; five cases, placenta previa. He speaks of two outstanding dangers, hemorrhage and rupture. Women with developmental defects conceive more readily because they approach nearer the animal state. He does not use the term double uterus, but prefers to group the cases according to the extent of the septum, as follows:

First group: Uterus septus; where the septum extends through the body and the cervix. Uterus subseptus; where it fails to divide the cervix or where it does not divide the corpus all the way.

Second group: Uterus in which a horn is free on all sides. Depending on the degree of nonunion, there is uterus arcuatus, ut. incudiformus, ut. bicornis, ut. didelphys. Uterus bidifidus denotes better the autogenetic relation of the uterus than the former phylogenetic name—ut. duplex. Clinically it is unimportant whether one is dealing with a septum or with two separate horns. The rarest of all is the complete splitting of the uterus, uterus bidifidus-didelpsys.

He reported his five cases as follows:

CASE 1.—Thirty-six years old, two abortions. First abortion followed by curettage because of pain and hemorrhage. Since then she has given birth to a living child. Double vagina, two cervixes and two uterine cavities. At operation later he found the uterus and adnexa bound down by adhesions. There was an opening in the septum near its middle due to penetration with the curette. The vaginal septum was divided, the cervix clipped with scissors, and the cervical canals united up to the

\*Reported at Meeting of St. Louis Gynecological Society, March 14, 1924.

internal os. Anterior colpotomy was done but the two horns could not be brought down because of adhesions. Laparotomy was done and a right pyosalpinx with a left occluded tube were found. Right tube removed, left salpingostomy. Pus escaped when removing the right tube and he did not attempt to unite the two horns. Instead a double ventral fixation was done. Two months later examination with a sound showed the right horn to be 8 cm. long and the left  $7\frac{1}{2}$  cm. long. It was after this operation that she had a living child.

CASE 2.—Aborted twice. Septum found but patient was not operated.

CASE 3.—Twenty-nine years old. Menstruated regularly with great pain, vaginal septum. Two uterine canals but the septum did not run the entire length of uterus. The septum was cut with scissors and the uterine cavity packed. Five months later conception had not occurred.

CASE 4.—Twenty-three, unmarried. Bleeding and pain. Vaginal septum. Two cervixes. Uterus showed only a slight groove. A large tumor was found behind uterus. Vaginal septum divided; cervixes divided and made into one. Abdomen opened and large pus tube removed. At autopsy five days later the uterus was removed and showed a septum 4 mm. thick.

CASE 5.—Twenty-seven, painful menstruation. Eight pregnancies resulting in seven miscarriages and one termination in the eighth month by hard extraction. Following this her menstruation occurred every two to three weeks and the pain became progressively worse.

Vaginal operation: Vaginal septum split, two uterine horns were brought down through an anterior colpotomy incision. With a knife the uterine septum was split down to the common cervix. Through-and-through sutures joined the two horns. Convalescence normal. He advises operation on all cases which have symptoms and the operation should not be delayed until trouble occurs during pregnancy.

H. Eymer<sup>2</sup> reported two cases as follows:

CASE 1.—Thirty-five years of age. Single. Severe dysmenorrhea, backache, profuse and prolonged menstruation, severe anemia. Abdominal operation; horns opened, saddle split, and the two horns united with catgut. After operation the symptoms disappeared, menstruation became regular and lasted only four to five days.

CASE 2.—Twenty-six, married, never pregnant, profuse menstruation, marked anemia. Bicornate uterus. Operation same as in first case. Symptoms cured.

Rosenstein<sup>3</sup> reported the following two cases:

CASE 1.—Twenty-seven, two pregnancies, no miscarriages, menstruation profuse, three week type, duration ten to twelve days. Double uterus. Laparotomy; one horn removed.

CASE 2.—Thirty years, married. Two pregnancies resulting in delivery at seven and eight months; one with placenta previa; both stillbirths. Vaginal septum, double uterus, laparotomy. Incision in outer wall of uterus, septum dissected out, uterus closed as in cesarean section. Later examination showed uterus normal.

Rockey<sup>4</sup> reported a case of vaginal septum and uterine septum corrected by the use of clamps. Forceps were placed along the anterior and posterior part of the septum and allowed to remain until the septum sloughed away. Four pregnancies followed. The above cases were selected from the literature to represent types and to show the various methods of technic employed.

The case I observed is worthy of mention because of the severity of symptoms, the technic employed, and the excellent result obtained.

A young woman, wishing to sacrifice her life to the cause of the church, found that she was seriously handicapped, because of frequent and extremely painful menstrual periods. So frequent and painful were these periods that she became half invalid and her life purpose was defeated. Having sought relief at the hands of several physicians, but to no avail, she disrobed herself of the veil and

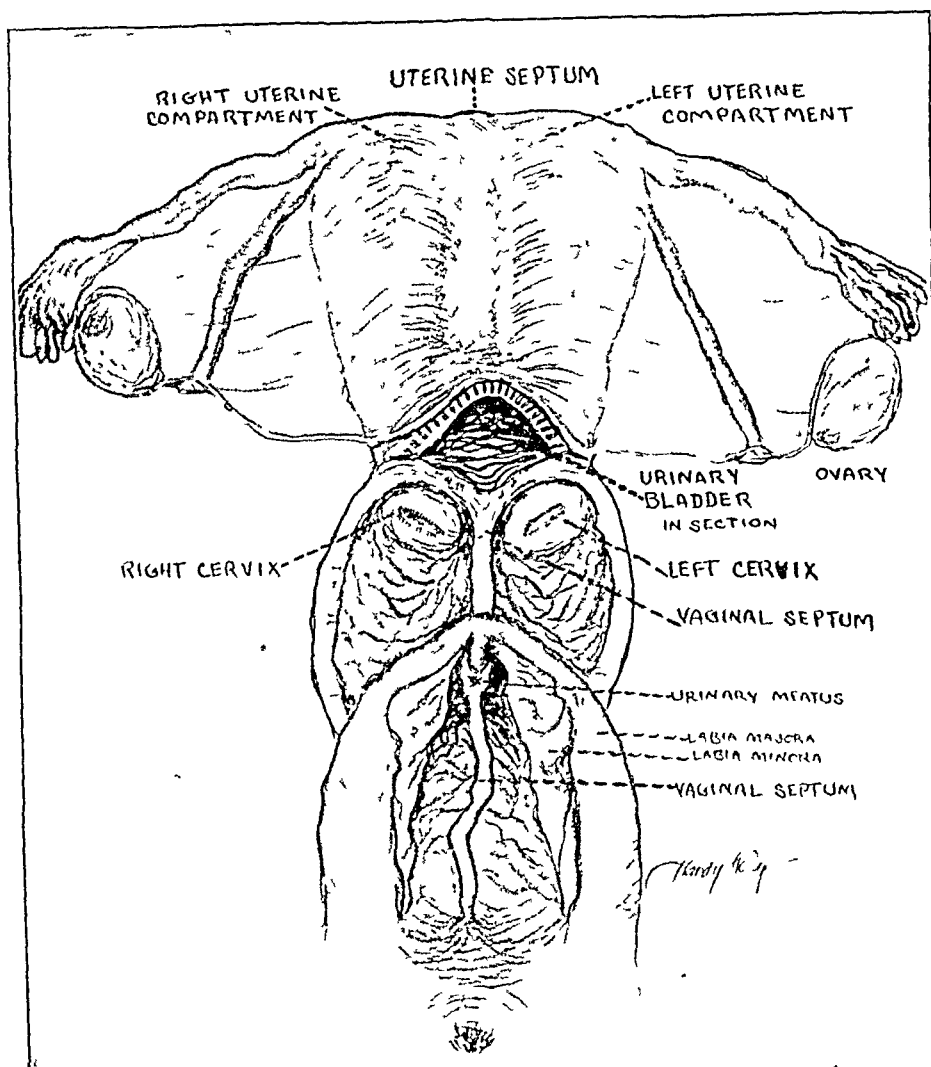


Fig. 1.

found employment in the diet kitchen of a hospital. The dietician, wanting to avail herself of full services, brought her to the gynecologic clinic and there I first met her in 1922. She was then apparently thirty-five years of age, of down-cast appearance, and unwilling to detail her past history except to state that she was bedridden most of the time, suffering with severe cramps in the lower abdomen, backache, and more or less constant bleeding. She was never free from backache, seldom free from bleeding, and always had cramps when flowing.

Menstruation began at the age of thirteen and from the beginning recurred regularly every two weeks and lasted from seven to ten days. The bleeding, never excessive, was always accompanied with cramps throughout the entire flow and this kept her in constant misery. Examination showed no abnormalities of the external

genitalia. The vagina was divided into two parts by a septum (Fig. 1) which extended from the introitus to its uppermost part. Two normal cervixes (Fig. 1) pointing backward but slightly deflected to either side were present. They were of equal size, conical in shape, about one inch in length, and three-fourths inch in diameter at the vaginal attachments. The uterus was in normal position, showing slight increase in its lateral dimension, but otherwise normal, except for a slight ridge (Fig. 2) which could be felt extending along the anterior surface throughout its entire length. Diagnosis: uterus septus, septate vagina.

At operation the following technic was carried out: The vaginal septum was

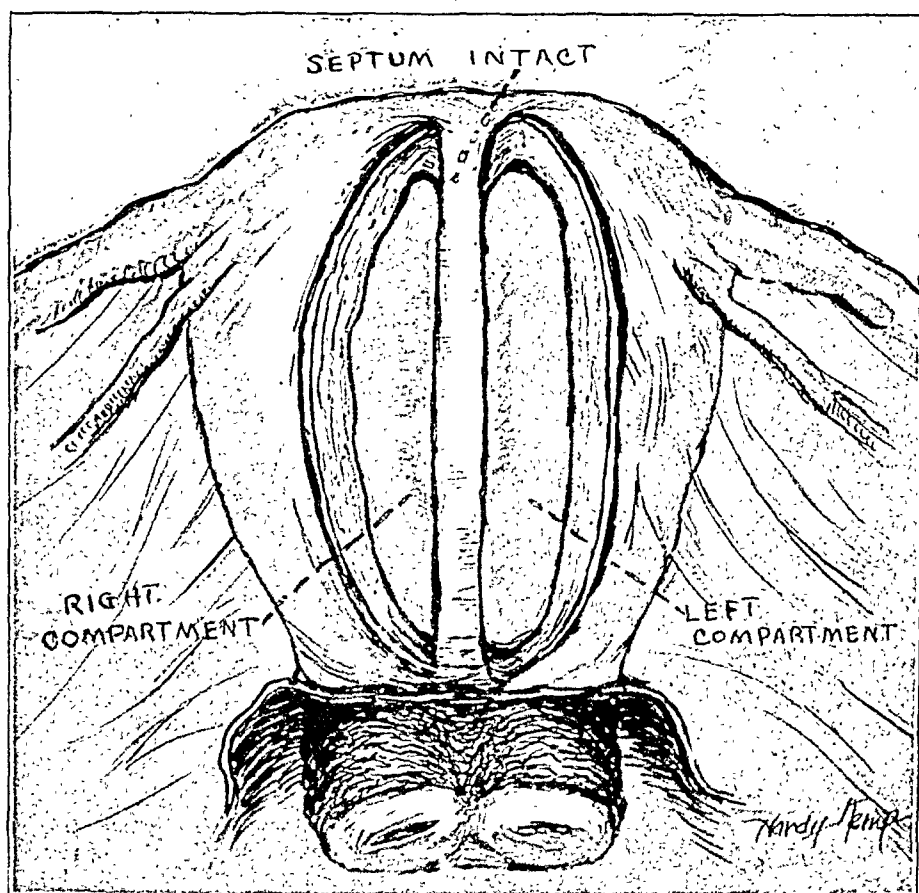


Fig. 2.

clamped anteriorly and posteriorly and removed. The cut margins were whipped over with No. 2 chromic catgut. Nothing was done to the two cervixes and they now look into one instead of two cavities. The abdomen was opened and the uterus exposed. The distance between the tubal insertions was three inches, the other dimensions were normal. Along the anterior surface of the uterus there was a slight ridge extending upward from the level of the internal os to the top of the fundus and over, and down the posterior surface to the vaginal attachment. The septum in the uterus could be clearly felt.

*Step 1.*—The vesicouterine peritoneal attachment was severed and the bladder deflected away from its uterine attachment.

*Step 2.*—A typical anterior hysterotomy incision (Fig. 2) was made just to the left of the ridge, and extending from the top of the fundus down to the level of the internal os. The left half of the uterus which appeared to be a normal

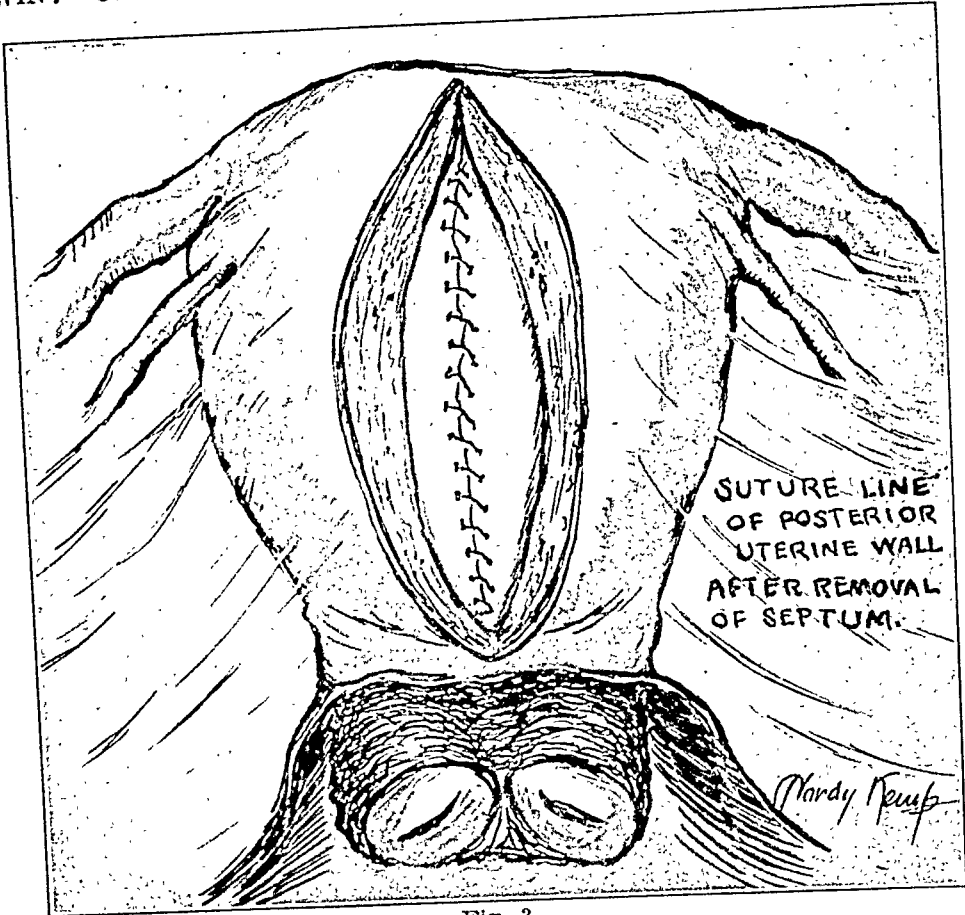


Fig. 3.

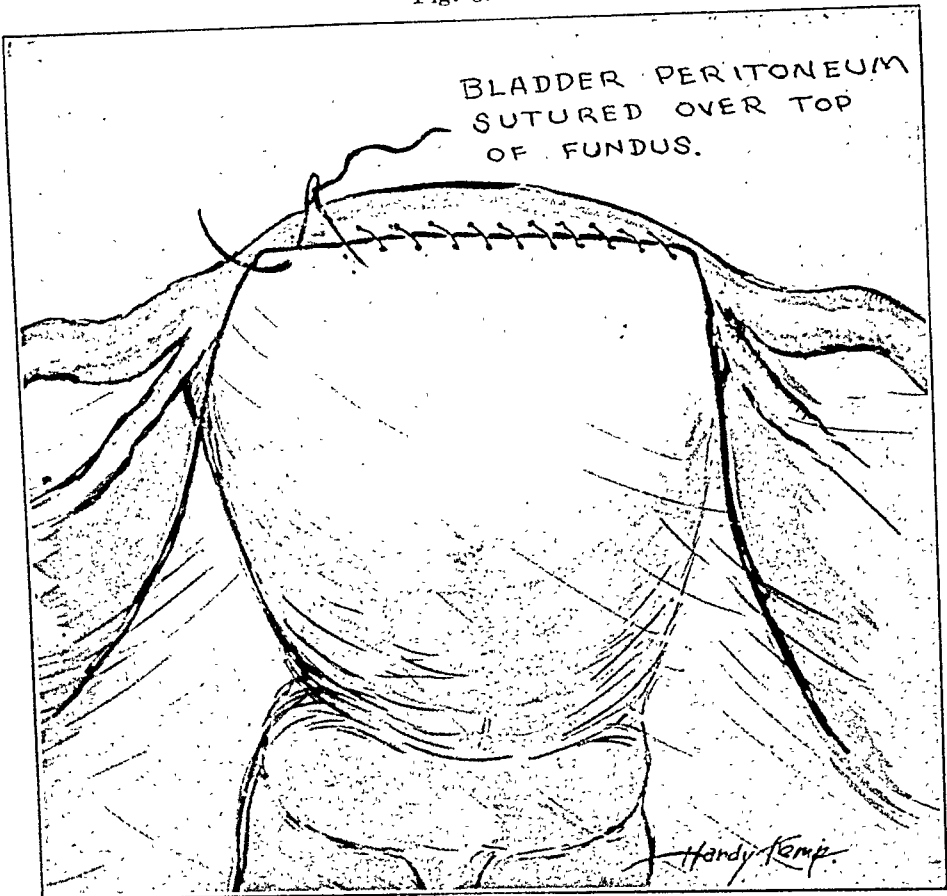


Fig. 4.

uterine cavity (for the septum was covered with apparently normal uterine mucosa) was now open.

*Step 3.*—A second incision (Fig. 2) was made just to the right of the partition, and now one sees two normal uterine cavities with the septum intervening.

*Step 4.*—The septum was completely excised along its superior, posterior, and inferior attachments.

*Step 5.*—With a suture of No. 0 catgut the defective area of mucosa was united superiorly and posteriorly (Fig. 3).

*Step 6.*—The uterus was closed anteriorly with three layers of catgut as in a typical cesarean operation.

*Step 7.*—The bladder peritoneum was sutured over the fundus after the "Gellhorn fashion," so as to cover the suture line on the uterus (Fig. 4). Recovery uneventful. Microscopic examination of the uterine septum which was 5 mm. thick shows muscle bundles arranged as in the uterine wall with normal uterine mucosa on both sides.

Subsequent history and examination of patient two years later showed her entirely free from backache and cramps at the menstrual periods, which come regularly every four weeks and last three to four days. She is finishing her third year of training in a school for nurses and has not been off duty on account of illness. Examination shows a normal vagina with no remains of the septum. The uterus is normal as to position, mobility, etc. The technic of the operation was original to me, for I was unfamiliar with the literature at the time although Strassman and Rosenstein had previously described a somewhat similar technic.

As was stated above most cases of uterus septus or double uterus come to the attention of the physician because of some complication in pregnancy. Mention is rarely made of symptoms caused by the septum in the nonpregnant state. A more painstaking examination of the cases of severe dysmenorrhea may elicit uterus septus as an occasional factor in these cases. In my own case the diagnosis was not difficult because of the presence of the vaginal septum which led to the suspicion of the presence of the uterine septum. Interesting points for speculation in my case are:

1. Did the septum act as a foreign body to produce cramps?
2. Was the mucosa covering the septum abnormal, thereby interfering with the normal menstrual process? If so the microscopist failed to recognize the abnormality.
3. Why did the menstruation which was of a two weeks' type revert to a four weeks' type immediately after the removal of the septum?
4. Did the septum mucosa have a stimulating effect on the ovarian function?

#### CONCLUSIONS

1. Uterus septus may cause severe symptoms in the nonpregnant woman.

2. Uterus septus should be corrected by operation before pregnancy occurs.

3. Hysterectomy is not a justifiable procedure.

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### TORSION OF OVARIAN CARCINOMATA\*

BY LEO S. SCHWARTZ, M.D., F.A.C.S., BROOKLYN, N. Y.

MALIGNANT epithelial tumors of the ovary, though relatively uncommon, are subject to the complication of torsion. In this phase they are clinically differentiated with great difficulty from twisted benign cystadenomata. A correct pathologic diagnosis of a tumor is of first importance, for incomplete surgery entails recurrence and the appearance of the disease in the opposite retained ovary and general metastases.

Carcinoma of the ovary appears in two grossly anatomic forms: (1) cystic, (2) solid. The cystic adenocarcinoma is the more frequent. Whether it is primarily malignant or represents malignant change in a papillary cystadenoma cannot always be told. Yet several gross features are distinctive. In the malignant tumor the cysts are smaller and more numerous and in many zones the tumor is compact and solid, for the locules have been filled by proliferating papillary masses. In a twisted tumor, soft and edematous or possibly hemorrhagic, from interfered venous circulation, these features are obscured unless the tumor is grossly sectioned. Only proper gross examination of the tumor will allow the differentiation of twisted cystic adenocarcinomata from the benign forms.

The solid type of ovarian carcinomata is more uncommon. It is an ovoid tumor, lobulated, retains the form of the ovary and is opaque in appearance. The consistency varies with the cellularity; the medullary form is soft and friable while the alveolar type is moderately firm on account of the larger content of fibrous stroma. With the advent of torsion, edema becomes marked and the tumors become soft and boggy thereby simulating clinically the cystic tumors generally considered benign. Gross section at the time of operation will at once avoid serious error for the absence of epithelial lined cavities indicates a solid tumor. The fibroma is easily differentiated by its compact whorls. Teratoma and especially round-celled sarcomata

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\*Read before the meeting of the Brooklyn Gynecological Society, October, 1923.



are not so easily recognized. Radical surgery applied to any solid ovarian tumor where fibroma can be ruled out will therapeutically compensate for the inability of fine gross differentiation in the presence of edema and hemorrhage as result of strangulation by torsion.

Three recent cases quoted below emphasize: 1st, the difficulty in the clinical diagnosis of twisted carcinomata from benign cystic tumors similarly affected; 2nd, the need of proper gross recognition at the time of operation; 3rd, the dangers of incomplete surgery.

CASE 1.—*Torsion of papillary cystadenocarcinoma; incomplete operation; recurrence in other ovary with metastases; death.*

Mrs. C. P., age seventy-three, was admitted to the Jewish Hospital of Brooklyn on September 5, 1922, complaining of pain in the left lower abdomen. The past

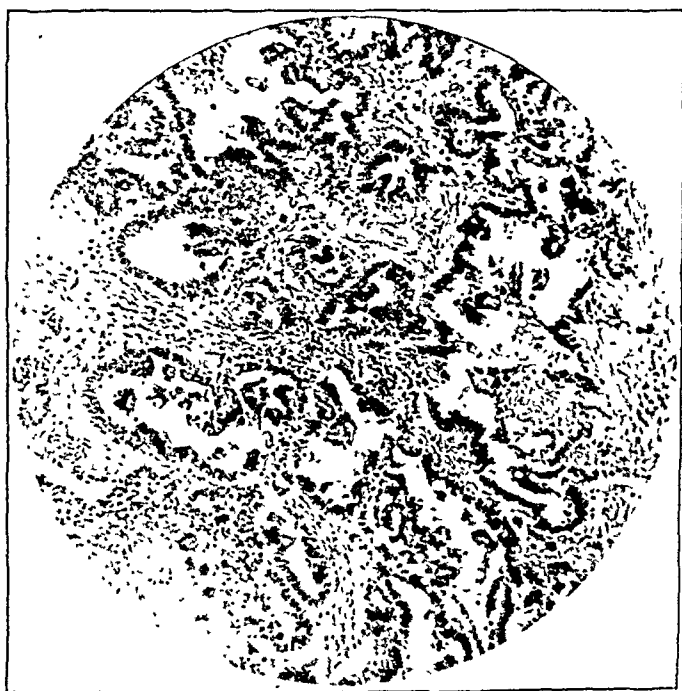


Fig. 1.—Section from the solid tumor zone in Case 1, X40. The papillary gland tubules are well shown. The lining cells are irregular and the nuclei hyperchromatic. The stroma is edematous.

history was essentially negative. Menopause occurred thirty years previously. Five days before admission the patient was suddenly seized with violent pain in the left iliac region and about the umbilicus, which was accompanied by vomiting and obstipation which persisted until admission. Physical examination showed a chronic endocarditis and a tense, ovoid, cystic mass felt in the left lower quadrant reaching 5 cm. above the level of Poupart's ligament. These findings were confirmed on vaginal examination. Diagnosis: Ovarian cyst with twisted pedicle.

At operation August 6th, 100 c.c. of serosanguineous fluid were present in the abdominal cavity. The left ovary was ovoid in shape and measured 7x4 cm. The upper pole was cystic, the remainder felt firm, and on section was yellow, solid and opaque. The pedicle of the twisted tumor comprised tube, uteroovarian and round ligaments. Two and one-half twists were noted. The right adnexa were normal. Because of the age of the patient and the poor tolerance of the anesthetic only left salpingoophorectomy was performed. The convalescence was uneventful and the patient was discharged on the fifteenth day. The pelvis was

negative. The patient was readmitted to the surgical service of the same hospital for symptoms of intestinal obstruction in March, 1923. At this operation the right ovary was the seat of a papillary tumor and several loops of jejunum were densely adherent and infiltrated. No surgical removal was attempted. The patient died within forty-eight hours.

*Pathology.*—The solid zone occurring in the tumor was grossly suggestive of carcinoma. The cysts in the upper pole were small and closely set. On section through the compact zone, gland tubules are supported by a moderate amount of edematous stroma. The glands vary in size, shape and contour and are for the most part irregular. They are lined by one or more layers of irregular cells varying in size and displaying hyperchromatic vesicular nuclei. Papillary infolds due to epithelial proliferation and stromal inversion are prominent and largely responsible for irregularity and contour of the glands. The vessels in the stroma are engorged (see Fig. 1).

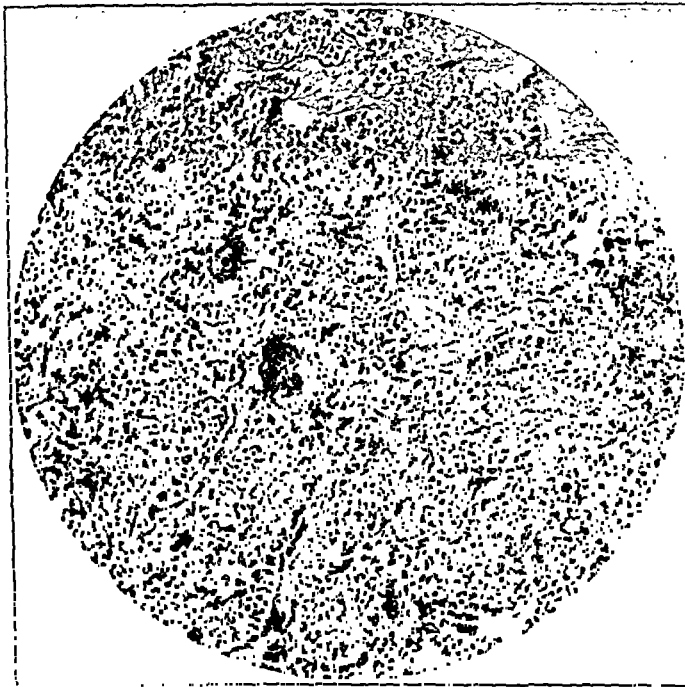


Fig. 2.—Solid tumor of ovary from Case 2, X40. The alveolar arrangement of the tumor is well shown. The septa contain numerous engorged vessels as result of interfered return flow following torsion.

*Comment.*—According to Pfannenstiel 90 per cent of all ovarian carcinomata are bilateral. In this case appearance in the right side was grossly manifested six months after a previous operation for left ovarian tumor. Inspection of the first operation showed apparently normal right adnexa. Complete surgical removal of all pelvic organs is therefore indicated in unilateral ovarian carcinoma even where no evidence of metastasis exists.

*CASE 2.*—*Torsion of solid ovarian carcinoma; incomplete operation; extensive metastases (pelvic, abdominal and thoracic); death.*

F. M., age sixteen, was admitted to the Jewish Hospital, August 10, 1922, complaining of pain and vomiting. Previous history was negative. Menstruation began at the age of eleven—always regular, every twenty-eight days, and of three days duration. Last period occurred five days before admission and was associated with crampy pains. These pains suddenly became most severe on the day previous to admission; vomiting and headache were associated symptoms. On examination, a spherical mass was felt in the right lower quadrant, extending from the pelvis

to the level of the umbilicus. There was no abdominal distention, rigidity or tenderness. Rectal examination revealed a small, anteverted, sinistraposited uterus. The right fornix was occupied by the soft tense mass which was felt abdominally. Diagnosis: Ovarian cyst with twisted pedicle.

At operation August 11, several ounces of free fluid were found in the peritoneal cavity. The mass, the size of a fetal head, which occupied the right iliac fossa, was found to be a tumor of the right ovary with a triple twist of its pedicle. The mass, tense and hemorrhagic on its surface, was soft to the touch. A left salpingo-oophorectomy was performed followed by appendectomy. The tumor was not opened before completion of operation. Convalescence was uneventful and the patient was discharged on the 14th day with a well-healed scar and a normal pelvis. The specimen was reported by the laboratory as a solid malignant tumor with edema. One year after operation the patient was seen by the writer. She presented extensive metastases in pelvis, abdomen and thorax and was actually moribund.

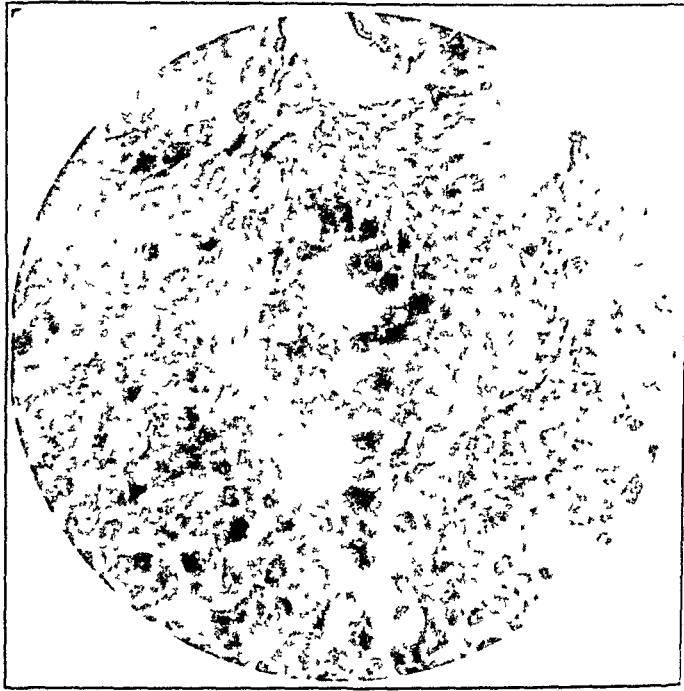


Fig. 3.—Tumor from Case 2. There is an irregular lumen in which the component cells are irregularly arranged. The large irregular nuclei are hyperchromatic.

*Pathology.*—On touch the mass was tense and gave sensation of fluid under pressure. This was the result of extensive edema of grey-white solid tumor found on gross section. Microscopically, the tumor was of the alveolar type. "The alveoli vary in size and shape and are fairly well demarcated by a scant fibrous stroma. The cells are irregularly arranged and display marked variation in size, shape and form. The cell outlines are fairly well defined but the cytoplasm is degenerated. The nuclei are vesicular, centrally placed and hyperchromatic. Many areas show advanced degeneration, probably the effect of the strangulated circulation. In occasional alveoli a semblance of a basal layer is indicated. The capillaries are engorged; foci of hemorrhage are present" (see Figs. 2 and 3.)

*Comment.*—Edema and hemorrhage resulting from torsion of a solid ovarian tumor render it clinically indifferentiable from a cystic tumor in a similar state. At operation, gross examination must be made by proper section. Since ovarian carcinoma metastasizes by the lymphatics to uterus, opposite ovary and pelvic viscera,

complete extirpation is always indicated. Solid tumors in young subjects are practically always bilateral and frequently of the embryonal type. Complete operation should be the rule.

CASE 3.—*Torsion of solid carcinoma of the ovary.*

Mrs. H. R., age forty-five, was admitted on June 4, 1922, complaining of persistent abdominal cramps. Symptoms began 48 hours before admission and grew steadily worse. Temperature 102, pulse 130 on admission. The abdomen was distended, a smooth tense tumor rising from the pelvis occupied the left iliac fossa and reached within 5 cm. of the umbilicus. On vaginal examination the cervix was tender and the mass filled the left lateral fornix and continued to the level noted previously.

At operation about 150 c.c. of free serosanguineous fluid was found in the peritoneal cavity. The left ovary was converted into a tumor 10 cm. in diameter. In portions it was solid in consistency and in other areas, cystic. On gross examina-



Fig. 4.—Simple adenocarcinoma of ovary, from Case 3. (X180) The glands are fairly regular. The lining cells are sharply defined by the basal membrane. Stroma is markedly edematous and holds numerous congested capillaries.

tion it appeared suspicious of malignancy. Because of the poor general condition of the patient (pulse 130) only a left salpingoophorectomy was performed. The pedicle presented four complete turns and was comprised of tube, uteroovarian and round ligaments.

*Pathology.*—The tumor is smooth on surface and measures 10 cm. in diameter. Though of solid structure, it is boggy as result of edema. Two cystic zones are the result of degeneration for no defined locules lined by epithelium are present. Microscopically, it presents the picture of simple adenocarcinoma. Gland tubules are moderate in number and separated by wide edematous zones of stroma. The glands are lined in most instances by a single layer of tall columnar cells with a huge oval vesicular nucleus. There has been no penetration of the basement membrane and the relative orderliness indicates adenoma malignum. Other tubules, however, show more advanced changes as indicated by multiplication of cell layers so that 3-5 layers irregularly distributed bound the lumen. Necrosis is advanced (see Fig. 4).

*Comment.*—The uncommon solid adenocarcinoma clinically simulated a twisted cystadenoma because of the edema, the fluid feel resulting from necrosis and degeneration. Proper recognition of a solid malignant tumor was made at operation. The poor general condition, however, precluded radical surgery.

The mechanism of torsion is as follows: The pedunculated tumor of the ovary has a normal range of motion which permits its migration from the pelvis to the abdomen. Freund has emphasized this as the usual cycle of an ovarian tumor. In the pelvic stage, the tumor drops in the culdesac because of its weight. This results in the displacement of the uterus anteriorly and to the side opposite the tumor. The pedicle is on the anterior face of the tumor and is comprised of the uteroovarian and broad ligaments; the tube running transversely across. As the tumor enlarges by growth, the upper pole extends above the sacral promontory. The latter acts as a fulcrum and the tumor is divided into an upper and lower lever arm. As a result of pelvic pressure against the lower end of the tumor the upper lever arm is carried anteriorly rotating on its pedicle and carrying the lower portion of the tumor upwards and backwards out of the pelvis. The ovary is now in contact with the abdominal wall, displacing the uterus posteriorly. The small intestines lie behind the growth, with large bowel on either side. As a result of this rotation, the ovary has described an arc of 90 degrees with a quarter twist in the pedicle which now lies on the posterior face of the tumor.

Several factors may prevent this normal range of motion. A firm abdominal wall, adhesions, fixation of the uterus and an accentuation of the sacral promontory are all antagonistic conditions. Tumors of small size remain confined to the pelvis. A short pedicle need not necessarily interfere for the tumor raises the uterus with itself and by rotation of the latter in its long axis causes abdominal migration.

Torsion in its clinical and pathologic sense ensues when the spiral rotation of the tumor has been effective in impeding the blood supply. This is the case when the pedicle has rotated at least 180 degrees. Though from one-half to two twists is the rule, as many as six have been reported. Clinically, torsion follows varied factors, such as: external violence; sudden body movements, as bending and falling; sudden changes of intraabdominal pressure, the result of coughing or vomiting or sneezing or straining at stool.

Torsion occurs in 15 to 25 per cent of all ovarian tumors. Every type of tumor is subject to torsion. Cystadenoma are most commonly affected, for they comprise about 75 per cent of all ovarian neoplasms. Actually, however, solid tumors twist more frequently. Thus fibroma, comprising only 2 per cent of all tumors of the ovaries, twist in 20 to 36 per cent of the cases. Dermoids, comprising 10 per cent of all tumors, twist in 10 per cent of all the cases, while simple cystoma of

the ovary, comprising 75 per cent of all tumors, twist in 15 to 25 per cent of the cases. (Figures for malignant ovarian tumors are not available.) In this light, torsion of three solid tumors here reported is of interest.

The effects of torsion on these tumors are the result of an interfered circulation. Occlusion of the arterial supply is uncommon and results in prompt necrosis of the tumor. As a rule, only the venous circulation is obstructed. Because of the resulting edema the tumor enlarges and the tumor is now a soft boggy mass not unlike the tense twisted cystadenoma on clinical examination, and in extreme cases even on inspection at operation. It is therefore essential that every tumor be immediately investigated as to its true gross pathologic condition.

The dangers of incomplete surgery are evident from the pathology of these tumors as noted in the microphotographs.

In addition, 90 per cent of all ovarian carcinomata are bilateral and 65 to 80 per cent recur. Appreciating the early metastases of these tumors, it would seem that in every clinically suspicious case, total extirpation of the pelvic organs should be performed. A gross examination of the tumor in case one, would have undoubtedly been followed by a more radical procedure and possibly would have prevented an early recurrence. This is essential in prognosis of the case for the patient should know that the operation may necessitate complete pelvic extirpation.

Freund, Pfannenstiel and Kronig advocate this radical measure even extending it to simple papillary cystadenomata. The latter, as is well known, are often bilateral and subsequent operation may thus be averted.

#### CONCLUSIONS

1. Solid tumors of the ovary twist more frequently than is usually supposed.

2. Clinically, twisted malignant epithelial tumors of the ovary cannot be differentiated from twisted cystic adenomata.

3. Immediate gross examination affords the only means of a true differential diagnosis. This is to be made before completing the operation.

4. A gross pathologic diagnosis of malignancy demands an immediate complete extirpation of the pelvic organs.

5. Only the most radical surgery followed by deep x-ray therapy may avoid an early recurrence and prolong life.

## X-RAY IN THE PRENATAL DIAGNOSIS OF FETAL MONSTROSITY

BY E. B. ANDERSEN, M.D., GRAND RAPIDS, MICH.

**M**EDICAL literature during the past two years has included several references dealing with the use of x-rays as a diagnostic feature in obstetrics.<sup>1, 2</sup> The chief value of a roentgenogram in a case of pregnancy lies in the fact that by using the same technic throughout a series of cases we get a comparative estimate of the development of the fetal skeleton. It is not my purpose to enter into the arguments for and against the use of x-rays in cases of pregnancy. In a short series of private obstetric cases it has been my good fortune, with the cooperation of Dr. T. O. Menees, Roentgenologist at Blodgett Memorial Hospital, to discover two fetal monstrosities before term. These we wish to report.

CASE 1.—Mrs. W. H., twenty-four years of age presented herself, Nov. 20, 1922, for prenatal care, being at that time apparently in the second month of gestation. Nothing of any significance was found in the past or present history of the patient. She had been married four years. The first pregnancy went to term and normal delivery,—the child at this time being three years old. The second pregnancy reached term and the patient went into labor July 21, 1922. After eighteen hours of labor I was called by the patient's physician. A careful examination showed that dystocia was accounted for by a hydrocephalic head the size of a basketball. Craniotomy was done, and delivery and recovery were uneventful. This, the third pregnancy, proceeded normally to the end of the eighth month of gestation, at which time a roentgenogram was taken. This showed that we were again dealing with a monster (Fig. 1) and pregnancy was terminated to save the patient the burden of the remainder of the prenatal period for a nonviable fetus. Physical examination, including blood Wassermann, of this patient was entirely negative. Postpartum recovery was accompanied by pelvic infection and the patient was later operated for a left ovarian abscess and sterilization. The question of etiology in this case may rest with the fact that her husband is a first cousin.

CASE 2.—Mrs. L. B., age thirty-five, was first seen May 20, 1924. She presumed to be approximately at the end of the seventh month of gestation and complained of marked edema of the legs, "heartburn" and insomnia. Pregnancy had been normal until these symptoms became rather definite, about six weeks previously. The patient had been married nine and one-half years. The first pregnancy terminated normally at term six years ago; the second pregnancy terminated spontaneously at the end of the third month three years ago. Her past history was entirely negative. Physical examination at this time revealed no significant deviations from the normal except as follows: The uterus was apparently the size of a full eight months' pregnancy with the fetal presenting part floating. The breasts were rather underdeveloped for this period of gestation; the legs were definitely edematous due to pelvic pressure and the left sacroiliac joint was tender. The patient was asked to return in three weeks. At this later time she felt decidedly more

miserable through the abdomen and pelvis, had vomited every evening during the two weeks just passed, and was unable to get any rest. A roentgenogram was taken and the following very valuable information was obtained: (Fig. 2.) "Films of the abdomen show two fetal skeletons. One is very much smaller than the other and has no cranial vault and the base of the skull is in such a position

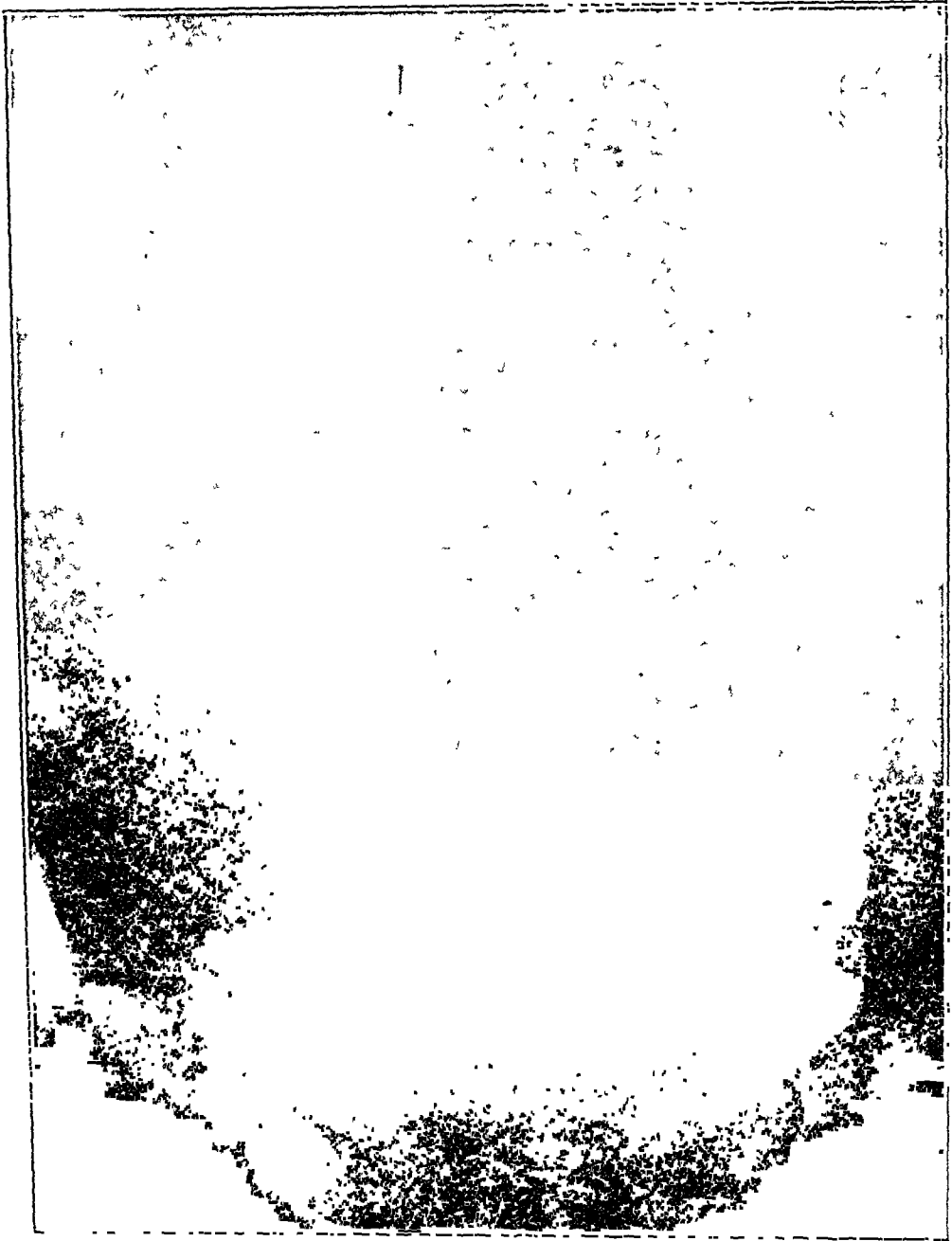


Fig. 1.—Roentgenogram taken at the end of the eighth month of gestation showing an anencephalic fetal skeleton in breech presentation.

there is no room for a properly shaped fetal head. This would suggest an anencephalic monster. The other fetus is larger and apparently normal." Thus we were dealing with an abnormal twin pregnancy and possible death in the monster. One fetal heart was to be heard. After consultation it was decided to terminate this pregnancy inasmuch as the larger normal fetus had reached a viable period. Delivery and recovery were uneventful. The normal fetus weighed four



pounds and five ounces, and developed normally. The monster weighed approximately two and one half pounds, was alive at birth but expired within a few minutes. This case presents several speculative features as regards fecundation.



Fig. 2.—Roentgenogram taken at the end of the eighth month of gestation showing a twin pregnancy with one normal fetal skeleton and one with anencephalus.

It probably was a twin pregnancy, bioval in type, in which the development of the stronger fetus was completed at the expense of the weaker.

To date, only a few cases of fetal monstrosity diagnosed by x-ray have been reported. We wish to add the above to those previously reported by Case,<sup>2</sup> Campbell and Willits,<sup>4</sup> and Spangler.<sup>5</sup>

## REFERENCES

(1) *Stein and Arcus*: Jour. Am. Med. Assn., July 7, 1923, p. 4. (2) *Speidel and Turner*: AMER. JOUR. OBST. AND GYNEC., June, 1924, p. 697. (3) *Case*: Surg. Gynec. and Obst., March, 1917. (4) *Campbell and Willits*: AMER. JOUR. OBST. AND GYNEC., January, 1924, p. 104. (5) *Spangler*: Amer. Jour. Roentgen., March, 1924, p. 238.

93 MONROE AVENUE.

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## Department of Maternal Welfare

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Owing to certain contingencies and delays, the material intended for this issue could not be completed and its publication will be deferred until the April number of the Journal.—Editor.

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# Society Transactions

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## AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SEVENTH ANNUAL MEETING  
CLEVELAND, OHIO, SEPTEMBER 18-20, 1924.  
(Continued from February)

DR. EDWARD SPEIDEL, Louisville, Ky., presented a paper on **The Conservative Treatment of Eclampsia**. (For original article, see page 320.)

### DISCUSSION

DR. PERCY W. TOOMBS, MEMPHIS, TENN.—Living a little further south than Dr. Speidel, we have great difficulty in effecting elimination. In our clinic in Memphis, we have used to a very great extent the Rotunda, the Stroganoff, or the McPherson treatment. We have a great many colored patients. There are about ten cases of eclampsia in the colored race to one in the white. We find elimination more difficult to obtain in this race than in the white.

I now use croton oil very extensively, and with absolutely no ill effects. Immediately on admission, we begin the McPherson treatment. If the patient is nervous or excited, we do not attempt gastric lavage, but we do put from two to four minims of croton oil in olive oil on the tongue. If we do not get results by elimination within the course of an hour, this dose is repeated. With six to eight to ten drops of croton oil we usually get the desired results.

We do not wait until the blood pressure is 170 to indulge in venesection. If we have a severe case with convulsions, we immediately lower the pressure to 100 by venesection. Our experience has been that the pressure immediately rises, and if it is not reduced or kept at a minimum as a rule there will be a tendency for the convulsions to recur.

DR. MAGNUS TATE, CINCINNATI, O.—The more we see of eclamptic cases, the more it seems to me that it makes little difference how we treat them, some will die and some will get well. The very best treatment, and the only treatment that the profession now accepts and acts upon as a unit, is that of the prenatal care. By means of education and systematic care of women in the pregnant state, we now know that we can reduce the cases of eclampsia very, very materially. The more we see of eclamptic attacks, the less manipulation, forced deliveries and operative procedure we do for them, the better they are. There is one thing however, that I believe is of great value, and that is a flushing of the body, getting rid of material which is usually found in the stomach, as that may have been the inciting factor in starting the convulsion; and flushing out the bowels is also important. Large doses of Epsom salts (through stomach tube) I believe, is the best cleanser, as it produces copious evacuations. If the convulsions continue, morphine is the most reliable remedy.

JAMES E. DAVIS, DETROIT.—I want to question or challenge the statement that blood pressure in this condition ever produces a spasm of itself. In regard to the edema, the question could be asked, is edema a cause or effect? It must be conceded that it is an effect, arising from the condition of the cell, and has to do with the process of exosmosis more than with endosmosis.

In regard to *veratrum viride*,—there is no possibility of this drug having any other effect excepting the one of distributing the toxin, and I think it is absolutely absurd to depend upon *veratrum* as a specific for this condition.

The outstanding feature of the pathologic picture, if you view the entire body, is that of a marked congestion. If the congestion is continued long enough, there is actual cell destruction, most prominent, perhaps, in the liver.

Now, any of these methods, or all of them, if given late, are not going to have any effect, excepting that of reduction or distribution. A great deal is accomplished, I am sure by the normal physiologic mass distribution of blood, and these several remedies, perhaps all of them, serve the very useful purpose of changing this pathologic mass distribution of the blood so that it approaches nearer the normal. Therefore, some of the alarming conditions are reduced.

DR. EDWARD J. ILL, NEWARK, N. J.—It seems to me we have heard a great deal today on the treatment of eclampsia, but not a word as to the cause. We hear much about nephritis and hepatitis but we hear nothing of the causation of these symptoms. For they are the result of the poison and not the poison. There are a few facts we do know. One is that the sudden death of the fetus causes a cessation of the symptoms. The removal of the fetus is also followed by a cessation of the symptoms in nearly all cases and is a therapeutic measure. We also know that an excessively large and rich meal is apt to produce the overwhelming symptoms, the symptoms once having been started. It seems therefore wise to remember what Davis has suggested, as well as those excellent suggestions of Dr. Panzer. In the treatment we must not forget that that of the primipara before or at time is quite different from the multipara. Cesarean section in the latter ought to be extremely rare. I trust the time will soon come when we can abandon this operation which often enough does so much harm by calling a halt to further conceptions except at a great risk.

DR. MUSSEY, ROCHESTER, MINN.—In his excellent discussion of this subject, Dr. Speidel has clearly shown how each type of treatment for eclampsia has worked in the hands of its author. One procedure may be of value in the hands of one man and another procedure in the hands of another, depending mainly on the routine with which it is carried out and the success he has with it.

When one has in mind the question of toxemia of pregnancy, one is prone to think of the possible cause, a subject which many observers have worked on and in which none have arrived at a satisfactory explanation.

An interesting observation was recorded by German and Austrian physicians who, during the war, noticed that the percentage of eclamptics was appreciably reduced. It was thought that the explanation for this reduction was due to the reduction of food ingestion, particularly of proteins, in these countries. Many of these women were reasonably well nourished on vegetables of the carbohydrate type but could not obtain the meat they were accustomed to having. What the ingestion of protein has to do with the production of eclampsia has not been determined but we all know that in connection with prenatal care, two of the things we try to impress on our patients are reduction in the amount of protein and adequate elimination.

During the war also, it was observed by some that the symptoms of the so-called trench or war nephritis were similar to those of eclampsia. The symptoms

of war nephritis briefly consist of a fairly sudden onset in a patient previously in apparently good health. After the onset, headache, blurring of vision and other symptoms of hypertension, mild grade of edema with either a marked decrease or even suppression of urine usually with blood in it, developed. The close similarity between these two conditions was also brought out by the absence in war nephritis as well as in eclampsia of any great change in the blood chemistry.

It was proved that the acute glomerulonephritis was the outstanding pathologic lesion of trench nephritis. There is no doubt that most patients dying from eclampsia have a periportal thrombosis of the liver cells and that in practically all cases there is evidence of parenchymatous nephritis.

Kosmak in his monograph states that the treatment for eclampsia is the same whether the disease be caused by liver or kidney and the treatment of these cases as outlined by Speidel is fairly identical with the treatment which was used for war nephritis. Another point which may serve to emphasize the similarity of the two conditions was the fact that in each there is an amelioration of symptoms coincident with an increase of the amount of urine secreted, lowering of the blood pressure and lessening of the edema. It is a question whether we may not have to change our views to some extent in feeling that possibly, although liver damage is present, the majority of symptoms which are produced are the result of the effect of toxin on the kidney.

DR. PAUL TITUS, PITTSBURGH, PA.—A most important part of Dr. Speidel's paper is the carefully outlined system to which he has reduced this treatment, with the injunction that nothing else is to be carried out in the clinic, thereby totally avoiding meddlesome maneuvers.

Speidel's reference to my work on the intravenous administration of glucose in toxemias of pregnancy was very gratifying. The only suggestion that might be added at the present time in that connection, is that the solution should be more concentrated and a larger dose of glucose given than he has recommended. I have been giving it in 25 per cent solution, and use 75 grams for the initial dose, repeating from time to time with subsequent doses of 50 grams each. As much as 75 grams may be given without much of any spill through the urine, and the body seems to utilize between 50 and 75 grams without difficulty. There is no question in my mind as to the protective action on the liver of glucose supplied to it at such a time, and an efficiently functioning liver is a most important thing in the presence of any toxemia.

About three years ago I had the honor of addressing the Sloane Hospital Alumni Society on this subject, and at that time De Forrest of New York made a very practical suggestion. He said that it was all very well to recommend to men practicing in hospitals this intravenous administration of glucose solution but that properly prepared glucose was not available to the average man in outside practice. He suggested that some pharmaceutical firm might be induced to put this up in ampoules. Ampoules are now to be had containing 25 grams of glucose in 50 c.c. of water which can be diluted as desired.

I might say also, that the action and effect of glucose in the body is augmented in a perfectly obvious way by the simultaneous administration of insulin. About one unit of insulin to five or even ten grams of glucose will add distinctly to the therapeutic effect of the glucose.

DR. THORNHILL, WATERTOWN, N. Y.—A recent case of vomiting in pregnancy was clearly and promptly cured by the intravenous injection of glucose

solution. Two years ago this patient required a therapeutic abortion for her desperate condition on account of pernicious or uncontrollable vomiting, acidosis, and all the things that usually go with it. In this pregnancy, vomiting began immediately after she missed her first period. She and her husband and some friends had been to New York and indulged, apparently, in indiscretions in eating, and they both came home sick. That was the beginning.

Her vomiting did not clear up; it became worse in spite of all treatment. We moved her to the hospital after a reasonable time, and there went through the usual procedures of the quiet room, starvation, rectal administration, without results for five days. In the meantime we made daily urinalysis and found a trace of albumin and an occasional granular cast. This patient had in previous pregnancies, shown a chronic nephritis. The question was whether that previous pregnancy become a primary cause or a result of her failure. Ten grams of glucose solution were injected intravenously. There was some improvement the first day, but she was still unable to take anything by mouth. On the second day another ten grams of glucose solution were given intravenously, with very remarkable, and very gratifying results. Vomiting ceased immediately, the nausea disappeared, hunger returned, and the patient expressed a desire for a chicken sandwich, which was given her and retained, and from then on she gained in every way in a rather phenomenal manner. Now, that is in line with the administration of glucose solution to substitute for the blood withdrawn in eclampsia, for there is good reason for not administering saline solution in such cases.

DR. CAMPBELL, GRAND RAPIDS, MICH.—I found in my own work in this connection the introduction of a self-retaining catheter in case of eclampsia helpful. In these cases, large quantities of urine are held in the bladder and the patients are not always able to void. The catheter is introduced when the patient first comes to the hospital and it has been left in for ten days without any ill effects whatever.

DR. SPEIDEL, (closing).—I think the members of the society noticed that I am somewhat of a crank on routines in the treatment of some of these disorders, having presented a paper last year on the routine treatment of hyperemesis, on the assumption that if you have a definite method you can more readily find out whether the method is good or where its weak points are, and the method can be followed by the general practitioner; whereas, the expert can very easily individualize when he finds there is a weakness in any certain part of the method.

I think the most important thing to consider in regard to this question of eclampsia that I have brought out, is that the obstetricians in this Society ought to begin to do some constructive work in obstetrics. This work has been taken up by the obstetricians in Great Britain, that is, the tabulation and collective results of various treatments, in order that instead of indiscriminately, year after year, having a paper on eclampsia, we report here each year results of certain methods that have been used, and then have the obstetricians of this Society endorse a method for a certain time, and at the next meeting they can either improve on that method or remove their endorsement from such a method. I would be willing at the present time to endorse the Rotunda method, considering the results that have been obtained by it. There is a similarity, between the McPherson and Stroganoff methods, and the only thing we have tried to add to the Rotunda method in the routine we use is the conduct of all the manipulations under nitrous oxide and ether in order not to incite convulsions.

DR. ARTHUR T. JONES, Providence, R. I., presented a Report of Two Cases of Bicornate Uterus with Pregnancy.—Cesarean Section. (For original article, see page 347.)

#### DISCUSSION

DR. F. A. CLELAND, TORONTO, CAN.—This case reminds me of one of my own. It was similar in so far as the patient had had a miscarriage at about the fifth month and had almost bled to death. She became pregnant again, and was sent to me bleeding, and supposed to be suffering from either another miscarriage or ectopic pregnancy. In passing, one might say these cases are frequently mistaken for ectopic pregnancies. We made that diagnosis with the reservation it might be a bicornate uterus. The operation performed was almost identical with the one Dr. Jones described in the first case, except the pregnancy was in the right side instead of the left, and I attached the round ligament to the right side as he did to the left.

That was in July, 1922. She became pregnant in the fall of 1923 and in June, 1924, was delivered of a living child at eight months. An interesting point in regard to the case was that I was unable to find a right kidney. The left kidney was about one and one-half times the size of a normal kidney.

In the second case, one can scarcely question the advisability of the cesarean section. Potsky in 1920, reported a case almost similar in which he did cesarean section on account of prolapse of the other cornu of the uterus, also, four other cases with retroversion of the second cornu, and the patients were delivered in the natural way. As Dr. Jones has pointed out, these cases are not extremely rare, but one would need to have an immense obstetric and gynecologic experience to meet many of them. Notwithstanding the fact that we don't meet very many, we have to teach the students.

To keep my own mind clear, and also to help them, I divide these cases into two groups. If you read the textbooks, you find they are overloaded with terminology. Certain terms are applied to different conditions, and different conditions are described under the same names. To get over that difficulty, I try to make the matter clear to the students by pointing out (which I don't need to do to this society), that the reproductive organs in the female are formed by the fusion of the müllerian ducts. If you divide the cases into two main groups, you may call one group, those of imperfect or arrested development. This group embraces complete absence of the uterus, rudimentary uterus, absence of the vagina, etc., etc. The other class could be described as those which go on to double formations. For diagnostic purposes that is rather a good way to present the abnormalities. Students seem to grasp it.

The first class of imperfect or arrested development will present themselves on account of symptoms, which are the symptoms of amenorrhea or sterility.

The other cases usually occur in perfectly normal, healthy women, oftentimes present no symptoms and are usually discovered accidentally.

DR. FRANKL, VIENNA, AUSTRIA.—In regard to malformations of the uterus, I have always found two most interesting facts, first the relationship between malformations of the uterus and tumors, and second menstruation in the case of malformation. As regards the first specimens of very different types of malformations of the uterus, I find that the more intensely we study these specimens, the more frequently we find a very frequent relationship between malformations of the uterus and the development of tumors.

We find three degrees of development with the rudimentary horn, either a horn the size of a walnut, which has a cavity and well-developed mucous membrane, or

we find only a rudimentary horn which is of the same size or smaller, perfectly solid, and here and there some very small cavities, or no cavity. In all of them we quite frequently find myoma. Without a doubt it is the same coincidence which we find in so many other fields of human physiology, the coincidence of malformation and development of tumors. We likewise see the tumors of the kidney combined with malformations of the kidney.

The second question in malformations of the uterus is that of menstruation in the nonpregnant horn of the uterus and the development of the other one. Specimens of bicornate uterus or uterus didelphus with pregnancies which had tumors, showed always that either the nonpregnant horn had no cavity, and then, of course, there was no mucous membrane and there can't be any menstruation with no mucous membrane, or there was a cavity, and the mucosa was always fully developed and very thick. Certain observers claim to have seen pregnancy in the bicornate uterus in one horn and the other horn would menstruate. This I absolutely deny. I think it is absolutely impossible when pregnancy exists in one horn of a bicornate uterus that there can be any menstruation.

I induced one of my colleagues in Vienna to study this whole question, and he showed also in those cases of pregnancy in the normally developed uterus that it was not menstruation; it is only bleeding at the time menstruation should happen, in consequence of erosions or polyps, and it is the same in the bicornate uterus with pregnancy. Real menstruation during pregnancy is impossible.

J. F. BALDWIN, COLUMBUS, O.—Many years ago I operated upon a young girl for acute appendicitis. The usual incision was made and the appendix removed. It was then found that she had a one-horned uterus, the right horn running very high up so that it was almost in the way of an operation. There was no trace of any appendages on the opposite side. I warned her people that in case of pregnancy there would likely be trouble. Later she married, became pregnant and everything seemed to be normal. She fell into labor but her pains were entirely inefficient, and after waiting many hours I finally performed cesarean section. The uterine walls as anticipated, were remarkably thin. She possessed only half a uterus. Both mother and child recovered, but by previous understanding I did not remove the tube.

In another case I was called to see a woman who though married for several years had never become pregnant. In examining her with two fingers, by accident my fingers slipped astride a membrane and I then found that she had a double uterus and double vagina. I noticed a curious malformation in that there was a notch in each cervix next to the dividing membrane, just such a notch as we so frequently see in cases of laceration of the cervix.

I have had two cases of women who each had a two-horned uterus and a number of children. No one had detected any malformation and the children had all been born without any difficulty. In both of them subsequent pelvic pathology developed requiring operation and the malformation was then discovered. In both these cases the indications were that pregnancy had taken place in both horns.

I had another case in which there was a one-horned uterus with a partial development of the second horn, but the cavity in the second horn did not communicate with the cervical canal. This undeveloped horn protruded from the uterus about like a fibroid. The patient suffered excruciating pain at each monthly period from her first menstruation. The pain came on with the flow, and continued for some time afterward. She had become a mere wreck. I made a hysterectomy and found the condition as stated. The cavity in the undeveloped horn was about as large as the end of my thumb. Later I saw another patient with an identical history and with identical conditions. At the operation the undeveloped horn was removed



but the other was left so that in case of her marriage she might become pregnant, but I have heard nothing from her since she left the hospital.

DR. FRED M. DOUGLASS, TOLEDO, O.—I saw a case four years ago in consultation, of a young lady about 28 years old, married, with one child two years old. She had missed three periods, and I was called because of the excruciating pain in the abdomen, and rapid pulse. Upon examination we found a tumor about the size of a grapefruit in the left side, and we made a diagnosis of a twisted ovarian cyst complicated by pregnancy. She was moved to the hospital, and we found pregnancy in the left cornu, which was ruptured, and blood seeping into the perineal cavity. We resected this cornu, closed the left side of uterus in layers, and a year and a half later she again became pregnant and was delivered of a normal child in the hospital without cesarean.

DR. JONES, (closing).—My reason for doing a cesarean on the first case was that I considered her as though she had been a previous cesarean section. I had amputated the left horn of the uterus, and my incision was as large as the ordinary incision would be in a cesarean. That horn communicated with the right horn, and I closed the incision in the uterus as you would close a cesarean. Having done that, I took the position "once a cesarean, always a cesarean," and although this woman might deliver herself naturally as a case which had been cesareanized once, might deliver herself spontaneously at the next pregnancy, yet I think we all take the stand we should not let her do that.

Another thing, I reported these cases because I have looked at the subject from a surgical as well as obstetric standpoint. In the first case, at the original operation, we might have done a hysterectomy and removed this malformed uterus, but here was a little woman who was very anxious to have a child, and it was necessary to remove her left horn, but we left the right side, and when she found that she possibly could have a child by cesarean, we gave her that opportunity, and fortunately she became pregnant and has her living child. In the other case I felt we had our definite indications.

DR. ARTHUR H. BILL, Cleveland, O., read a paper entitled **The Modified Scanzoni Maneuver in the Treatment of Vertex-Occipito-Posterior Position.** (For original article, see page 342.)

#### DISCUSSION

DR. JAMES A. HARRAR, NEW YORK.—I am the member of the association who made the statement two years ago which instigated Dr. Bill to write this exceedingly interesting paper. I am in hearty concord with all his ideas on how he does the Scanzoni with forceps, especially his point not to make traction while rotating.

There are two general rules which call for interference in these cases. One, when there is no advance in posterior occiput with strong pains, and secondly when there is no advance with increasing extension.

The reason for my statement two years ago, that Dr. Bill seemed to do Scanzoni rotation more frequently than I have found it necessary, and also, that a manual rotation was safer for the baby than forceps for rotation, was based on the following figures from the New York Lying-in Hospital Service which I published in 1907. In 41,800 observed labors there were 1,446 persistent occiput posterior positions, and out of these 1,013 were born spontaneously, face to pubes. Of course in this 1,013, there were a large number of small babies and a large number of women with relaxed perineum and easy rapid delivery. Only 433 cases required artificial assistance including forceps operation 286 times. The result of the rotation with blades alone gave us a fetal mortality of 10.5 per cent. In manual

rotation done before the forceps were applied, we had a fetal mortality of 5 per cent, less than half.

In manual rotation it is very important to assist with external manipulations on the baby, pushing the fundus down to keep the head from slipping away, pushing the anterior shoulder across, with the hand that is not used in doing the Scanzoni, and it is certainly safer for the baby to turn it as a whole, than to twist its neck.

DR. GEO. CLARK MOSHER, KANSAS CITY, Mo.—I should like to comment on the necessity of avoiding traction with forceps when doing a rotation. A great many years ago Blundell stamped on the blades of his forceps "Arte Non Vi." I think that is the rule we ought to observe in any forceps delivery. It is not a matter of how much strength you may have in your arms, it is a matter of really using forceps, with the minimum of effort.

Dr. Harrar's statistics would indicate that perhaps 10 per cent is too high a number of nonrotating heads, but the Scanzoni, when it is applied in a careful manner, and by a good operator, I conceive to be a good practice in obstetrics.

DR. JAMES K. QUIGLEY, ROCHESTER, N. Y.—I quite agree as to the frequency of occipitoposterior positions. One point not brought out is the danger of contraction ring dystocia in the persistent cases, and as a prophylactic, early delivery either by version or forceps.

I do not think all cases of rotation should be done by the forceps as suggested by Dr. Bill, or that all cases should be delivered by version as proposed by Dr. Potter. In a multipara if the head is high I would prefer to deliver by version, in a primipara with engaged head I have much better success with manual rotation of the head, followed by a forceps application.

DR. IRVING W. POTTER, BUFFALO, N. Y.—I want to comment on one statement that was made, that to me is a little misleading, namely, that it is out of the question, or not good obstetrics to do a version when the head was in the pelvis, that those were the cases, if I understood Dr. Bill correctly, where the forceps should be used in Scanzoni procedure.

Our experience is entirely different. To be perfectly frank with you, I have never done a Scanzoni, but I have no doubt you know that I am the radical man he mentioned.

I want to say about the correction of this posterior position, that it is far easier to put your properly gloved hand up inside that uterus once, do a version and bring the baby out than it is to apply your forceps, twist, and then reapply them and twist again, and then pull.

DR. BILL, (closing).—Statistics show that fetal mortality where the Scanzoni method is used, is greater than where manual rotation is used. There should be no fetal mortality from forceps rotation *per se*. Whether there were stillbirths following the delivery of the child or not has nothing to do with the rotation, whether manually or by forceps, but with the subsequent extraction of the child. The rotation simply corrects an abnormality, changes an abnormal to a normal position, making the further management of the case the same as if there has originally been an anterior position. Injuries to the child's head or to the birth-canal are due to the extraction and not to the rotation. As Mosher said, it is important to reduce traction force to a minimum. The traction handle described was devised more than anything else with that in view. We try to make forceps work easy work. If a forceps delivery is a difficult one, we think forceps are contraindicated.

As far as spontaneous rotation is concerned, I agree with Harrar, statistics show that a large per cent of cases will rotate spontaneously, and I granted this in my paper, but Harrar does not say how many hours elapse from the time of

full dilatation until delivery; to how many unnecessary hours of labor the patient is subjected, which is the point which I emphasize more than anything else. Why subject a woman to hours of needless labor when we can, in a simple and safe procedure, whether it be forceps rotation or version, correct an abnormality and deliver the patient?

In regard to what Dr. Potter said concerning the use of forceps when the head is in the pelvis and the use of version in higher cases, that with one intrauterine manipulation he did a version, let me point out that in forceps rotation there is no intrauterine manipulation. If you put your hand up into the uterus and try to turn the child's body over as Quigley has suggested, I agree with Potter absolutely. I would prefer to seize both feet and do a version with one manipulation. But in forceps rotation we do not do that. The hand is not introduced into the uterus, the head is not displaced from the station in which it lies, but is simply rotated in this station, making without doubt the simplest method of delivery.

In regard to the choice between version and forceps, I think that every physician should be perfectly familiar with version and perfectly familiar with forceps work. Being perfectly familiar with each and having no choice, he can use his judgment in the individual case. Personally I have no choice and like to do one as well as the other. We must consider entirely the welfare of the patient and realize that there is a class of cases in which the forceps rotation is the simplest, and the best for the patient, and there is another class in which version is the best. Whichever of these procedures is used it may seem radical to interfere so much in posterior cases, but as I said in my paper, we are specialists; we are trying to improve obstetric art, and yet for years we have said in connection with all such procedures that they would not do in practice in general. Instead of bringing our art down to the level of general practice, let us bring our art up to a higher level and educate those who do obstetrics to that point.

DR. F. REDER, St. Louis, Mo., presented a paper entitled **The Anteposed Uterus**. (For original article, see page 356.)

#### DISCUSSION

DR. JOHN NORVAL BELL, DETROIT, MICH.—I believe Reder has drawn our attention to a condition that we have been overlooking. I have at the present time a patient, a young woman, who has given birth to one child, following which she sustained a retroversion of the uterus, which was cured permanently by the temporary use of a pessary.

She is now, about two years after the birth of her child, pregnant again, about three or four weeks, and is complaining of a bearing-down sensation. There have been absolutely no pathologic urine findings, her bladder is absolutely normal, there is no evidence of anything of the nature of cystitis, in fact, no pathology. The uterus is in splendid condition except it seems to be unusually or markedly anteposed, not apparently prolapsed to any extent. I agree with Reder's conclusion that there is an indication for treatment of some kind for these conditions.

DR. REDER.—I frankly admit my culpability in performing these operations simply because I failed to recognize the true condition. There are two papers that harmonize very much with my ideas about this condition, one by Dr. Polak, and the other by Dr. Phaneuf. I have operated on women complaining of back-aches and bearing-down pains for piles, fissures and fistulae in the hope of relieving the condition, but without success. Most of these were women who had not given birth to children, some were married and again some were not. If I would introduce a tampon, composed of a gauze bandage an inch and a half

in width, these women would feel perfectly comfortable. In two or three days they would come back to have the tampon replaced, because they felt so much better with the tampon in place.

It soon dawned on me that something must be radically wrong with the uterine supports. We know from our operations on the extremely retroposed uterus, that relief is given by a suspension operation. I ventured to perform a suspension operation on one of these women. It gave relief. Ever since I have subjected a descensus in the beginning stage that has been causing much discomfort to a suspension operation whenever permission from the patient could be obtained. Of course other measures for relief were tried before operative measures were resorted to.

**DR. F. A. CLELAND, Toronto, Ont.,** presented a case report of a **Large Cyst of the Cervix Following Supravaginal Hysterectomy.** (P. 349.)

#### DISCUSSION

**DR. H. W. HEWITT, DETROIT, MICH.**—Was that cervical stump, at the time you removed the tumor, in a healthy condition? **DR. CLELAND.**—Yes.

**DR. HEWITT.**—If that cervix had been removed at the time of operation, this tumor would never have resulted. It seems to me advisable to do complete hysterectomy in cases of fibroid.

John Polak, before the American Medical Association, reported 260 odd cases of cancer of the cervix found at examination in cervixes where the uterus had been amputated supracervically, and for that reason he advocated a complete hysterectomy in all cases of fibroid tumors of the uterus.

**JAMES E. DAVIS, DETROIT, MICH.**—In regard to the different diagnoses of such conditions, I think of three possibilities in a case like this. The first is the most common, viz., the formation of retention cysts in the cervix, exceedingly common after thirty years of age, usually multiple in character, and rarely ever very large. The secretion material within the cyst walls may be thin or greatly thickened. The second concerns the minor vestibular glands of the vaginal wall. It is indeed rare that these glands will be found high enough to be included in the cervical stump. However, it is quite possible that an aberrant gland could be included in the cervix, and might attain the size of the specimen shown here.

The third possibility (which I think Dr. Cleland concurs in), is probably the explanation of this condition, viz., an atresia of the internal os and an atresia of the outlet of the cervical canal, with the endometrium between these two points becoming cystic, or the endometrial cells carrying on secretion and producing the ordinary type of cyst. The size of the cyst is very unusual and its appearance is most interesting.

**DR. CLELAND.**—I searched the literature and could find nothing just like this. The only thing I know to compare it to is a mucocele of the appendix, which many of you have seen. It is really a retention cyst formation; there is no question about that. As Dr. Davis has stated, it is caused by a reaction going on very slowly, with the secretion gradually gathering in the cervix. The round ligaments were attached to it, and the microscopic section showed muscle and fibrous tissue, with epithelium lining both sides. There is some fibrous tissue, but it is all cyst and thin-walled. Of course, for mounting it has been packed with cotton. It was in the middle line, and I think it can very well be explained the way Davis has suggested, and the only thing I know of, that is comparable to it is a mucocele of the appendix.

*(To be continued in April number.)*

# THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF DECEMBER 9, 1924

THE PRESIDENT, DR. REGINALD M. RAWLS, IN THE CHAIR

## DR. WALT P. CONAWAY reported a case of **Chronic Appendicitis and Pyosalpinx Complicated by Vesical Calculus.**

K., colored, single, aged nineteen, student, was admitted to the Gynecological Ward in the Atlantic City Hospital, August 22, 1924. Except for a severe case of scarlet fever, her early history was negative. Menstruation began at thirteen years of age, was perfectly regular and without pain until the last few months. She was treated for gonorrheal vaginitis for two months. For the past two years she had been having frequent attacks of painful urination and often bloody urine for three or four days at a time. Medical treatment and vesical irrigations afforded temporary relief. She had been in bed for about ten days on two occasions, during that time suffering from pelvic inflammation of the left side. About six months ago she had an attack of appendicitis which subsided in about a week.

Five weeks before admission to the Hospital, she noticed that her urine was bloody at least once or twice daily and that the pain was more spasmodic in character with an occasional stoppage of the stream during micturition. Wassermann was negative, blood pressure 110-90 and T. P. R. 101-96-22. She had frequent chills and the urine showed specific gravity 1.019, with a moderate amount of albumin, some blood and pus, 90 W. B. C., to a field. The cystitis was considered secondary.

The diagnosis on admission was tuboovarian disease, left side, chronic appendicitis and vesical calculus, the latter confirmed by cystoscopic examination.

I operated on August 27, after the acute symptoms subsided. The left tube and ovary very much diseased, were removed, likewise the appendix, which was considerably elongated, retrocecal and imbedded in adhesions. I felt that our technic had been sufficiently careful to warrant an incision in the bladder at this time for the removal of the stone. Several small calculi, in addition to the large one which was presented, were removed, and a permanent small rubber catheter left in the urethra. The wound in the bladder was closed with two continuous sutures of plain catgut, and the abdominal wound closed with a continuous suture of plain catgut in the peritoneum and fascia, and silk in the skin. A few ounces of boric acid solution were instilled into the bladder daily until the fifth day, when the catheter was removed. The urine was bloody for three days after operation.

Except for a rise in temperature to 101° the first two days, her postoperative convalescence was uneventful. She left the Hospital on September 10, in good condition, thirteen days after operation. I saw her in my office about two weeks after operation. She spoke of feeling perfectly well, of being entirely free from pain, and of not having any recurrence of bladder symptoms.

## DR. JAMES N. WEST reported (1) a case of **Ovarian Pregnancy and Gall Stones** and (b) **Movable Right Kidney and Cysticercus Cyst of the Liver.**

1. Mrs. L. K., twenty-four, admitted to the Post-Graduate Hospital, July 14, 1924. Married four years. One child aged three years.

Three months ago went over period ten days. Had abortion done in the office of physician. Curettage without anesthetic. Had period five weeks later. The last period came on 2½ weeks late. Had pain before and after. Now complains of pain in the right iliac region, intermittent but was sensitive to pressure all the time for three weeks. Was wearing a hair pin stem in the uterus,—a very severe attack of pain came on three days after introduction of the stem.

Examination showed mass in the right side of the pelvis. Diagnosis chronic appendicitis and ectopic pregnancy. Operation July 15, 1924. Curettage, removal of the hematoma of right ovary, appendectomy, cholecystectomy. Gallstones were not suspected in this case. After removal of the appendix and the hematoma of the right ovary an examination was made of the upper abdomen. The gall bladder was found to be distended with stones. An incision over this region was made and the gall bladder removed with drainage.

The tube was entirely free and patulous. The pregnancy was entirely within the ovary.

The pathologist's report on the ovary was as follows:

"The ovary shows a very large corpus luteum with a very large hemorrhage. In the hemorrhage, formations can be found which are composed of a stroma lined by syncytia and formations which resemble syncytia. The former can be recognized as chorionic villi, the latter as chorionic epithelial cells. In one area the stroma of the ovary shows large pale cells resembling decidual cells. Ovarian pregnancy."

2. Catherine P., aged thirty-four years, married seventeen years, two children aged eight and sixteen years. Had a miscarriage three years ago. Menstrual history negative, no serious disease since childhood. Complaining of pain in the upper right quadrant of the abdomen for five or six years, also pain in the right lumbar region. Examination of her lungs negative, pelvis negative, abdomen shows a mass extending from the gall bladder region down to a point below the umbilicus, super-imposed upon the right kidney or attached to it. The right kidney seemed to be movable.

Diagnosis, movable right kidney. Abdominal tumor of the upper right quadrant attached to liver.

An x-ray showed the kidneys to be practically normal in size and situation and functional test showed normal function. The patient was operated upon the next day. An Edebohl's fixation of the right kidney was made through the incision extending from the lower border of the last rib, to a point two inches above and to the left of the crest of the ilium. The abdominal mass could be felt extending upward toward the liver. An incision of about six inches in length was made in the peritoneum and the mass forced up into the incision. It was firmly adherent to omentum ascending and transverse colon. Adhesions were separated and tied when necessary and when free the mass was found to be attached to the liver at the cleft above the gall bladder. It was clamped off, cut away and removed without rupture. The perineum was closed with catgut. The wound was closed in layers and with through-and-through silkworm-gut. A cigarette drain was placed down to the perineum. The patient made an uneventful recovery and returned to her home on November 17.

The pathologic report was as follows:

Gross.—Specimen is a pear-shaped body which has been incised. It measures 200x70x65 mm. It is a cyst with a wall 3 to 5 mm. thick which contains a great number of small cysts with thinner walls filled with clear fluid. The fluid, on microscopic examination, contains cholesterol crystals. Hooklets cannot be found as yet.

*Microscopic.*—Sections from the wall of the mother cyst show a lamellated structure of dense connective tissue with very few connective-tissue cells and a few foci of round cells. The examination of the content of the wall of the cyst reveals scolices and in one cyst two *Taenia echinococci*. These latter findings are very remarkable because as a general rule the taenia are only found in dogs.

*Diagnosis.*—Hydatid cyst (*echinococcus*).

The patient had her symptoms for a long time and had consulted several authorities, but received various diagnoses until her mind had become confused and her confidence shaken in medical advice. It was this mental attitude on her part which determined me in the precipitate action of making immediate investigation and performing operation in 24 hours after seeing her.

## DISCUSSION

DR. HERMANN GRAD.—About six years ago I had a case of *echinococcus* cyst of the liver at the Woman's Hospital, which was ruptured during the manipulation. It was diagnosed as gall bladder disease at the time and a large amount of this material escaped into the peritoneal cavity. The patient was in bad condition and not much could be done except to pack the cavity with gauze. She recovered. Two years later she had an *echinococcus* cyst in the spleen. She remained perfectly well during that time apparently and had a baby in the meantime. The cyst in the spleen was very much larger than the one in the liver and I could not remove the cyst wall in that case. It was tremendously adherent. All I did was to drain. The patient was very stout and it was a very poor risk to try to dissect it out. The cyst suppurated for a long time. Finally I filled this large cavity with sugar several times, the cyst became obliterated and the woman is perfectly well. I have heard of her only recently and she has remained well and no further *echinococcus* cysts have developed.

DR. JOHN O. POLAK.—When I was in South America two years ago it seemed as though these *echinococcus* cysts grew on everybody. Every clinic that we were invited to, presented us with one of these cysts for operation. The interesting thing to me was a suction apparatus with a very forcible pump that emptied these cysts and then they did what Dr. Grad spoke of, filled them with sugar.

DR. EMIL NOVAK, Baltimore, Md., (by invitation) presented a paper entitled **The Correlation of Uterine and Tubal Changes in Tubal Gestation.** (For original article, see page 295.)

## DISCUSSION

DR. JOHN O. POLAK.—The work that the doctor has done is along the same lines of study as that which Dr. Wolfe, Dr. Welton and I have been doing since 1920. I am glad to note that Dr. Novak has confirmed the two or three points we made in our conclusions.

We have found definite decidual reaction in the uterus in live unruptured ectopics and that even after curettage, if the ovum is still alive, it reforms. This reaction ceases with the death of the ovum and is succeeded by retrogressive changes in the decidua. There was nothing definite in these cases if the ovum had died, for the endometrium showed only an interval mucosa. Everything that has been brought out in this sort of work is of very considerable value. I think, however, the most valuable point the doctor has presented to us tonight is the fact that we cannot make a diagnosis in these cases by curettage unless the ovum is alive. What we have tried to do in cases where a tubal pregnancy has been removed, is to go back and curette the uterus so that we could have something to

compare and correlate with the changes taking place in the tubes and we hope that in the future we will be able to contribute something of value along this line.

DR. I. C. RUBIN.—Fourteen or fifteen years ago I made routine curettages on cases of suspected ectopic pregnancy with the idea of comparing the endometrial changes not only for diagnostic purposes clinically, but also for the purposes of comparison between the endometrial and tubal findings. Only recently have we advanced to a clearer exposition of the changes that take place in the entire menstrual cycle. The thing now becomes clear and the pictures and slides which Dr. Novak has shown us are absolutely true and the interpretation likewise.

I think that we may definitely say that (except in those cases where there is some extraneous traumatic factor not at all connected with the pathology of tubal gestation, which may cause the accidental bleeding) the uterine bleeding in ectopic gestation generally follows fetal or embryonal death. The mechanism of the bleeding is not only due to the fact that the fetus is dead. The bleeding is not a reflux from the tube down through the uterus, though that may occur if there is marked hemorrhagic distention of the tube and the uterine ostium of the tube is patent and not occluded by decidua; but the genesis of that bleeding takes place in the corpus luteum of the ectopic pregnancy. The corpus luteum either undergoes hemorrhagic change, a traumatic change if you will, the integrity of the corpus luteum is destroyed, and its inhibitory action upon the endometrium stops. The process is the same which occurs in menstruation except that it occurs more abruptly. We know that the corpus luteum of menstruation remains intact until the menstrual flow begins. Menstruation means that there has been ovular death. With ovular death there at once begins regression of the corpus luteum. The hemorrhage into the endometrium is initiated by thrombotic changes that were beautifully shown on the screen, and the casting off or sequestration of the endometrium takes place either *en masse* or as in menstruation, piecemeal. In ectopic gestation the corpus luteum undergoes destruction and with that destruction there then begins the hemorrhagic change in the endometrium. The idea, of course, is that without the inhibitory control which the normal corpus luteum exerts, certain ferment substances, proteolytic in character, are now flooded into the endometrium or elaborated by it; that there is diapedesis and rhexis of the fine capillaries with necrosis and a resulting separation of the endometrium; the same process goes on as in menstruation, but in a less characteristic fashion. That is due directly to the peculiar corpus luteum pathology associated with ectopic pregnancy.

DR. B. C. HIRST, PHILADELPHIA.—It would be of interest to unite the glycosuria test with the question of the determination of the life or death of the embryo in ectopic gestation. I was able to say in one clinic lately: Here is a case of ectopic gestation; the ovum is implanted in the outer third of the tube and the embryo is still alive, and in the same clinic hour, here is another case of ectopic gestation; the ovum is implanted in the isthmus of the tube and the embryo is dead. Would it not be useful to unite this glycosuria test with a study of these changes in the endometrium, for by that test you can usually diagnose positively the life or death of the embryo in ectopic gestation. Has this investigation been carried out by any one here?

DR. REGINALD M. RAWLS.—At the Woman's Hospital we have been undertaking to use the glycosuria test in certain cases of ectopic gestation. At present we only have five or six cases, and in most of those it was not conclusive because the embryo was dead at the time, but we are continuing the work. We have not, however, enough material to say anything definite as yet.



DR. S. H. GEIST.—In all probability the reason for the absence of a definite decidual reaction in the tube is the difference in the character inherent in the mucous membrane itself. In the uterus the presence of the ovum, or, under proper circumstances, of any foreign body, results in the formation of a decidua or a localized decidual reaction (deciduoma). In the tube, however, even in the presence of pregnancy, the decidua, as has been mentioned by Dr. Novak, never takes as complete a form as found in the uterus but may occur in patches and at times only involving a few cells. The uterine mucosa has a very definite characteristic stroma, whereas the tubal mucosa consists of epithelium, for the most part ciliated, supported only by thin connective tissue stroma which separates it from its muscularis. As before mentioned, it would seem that the supporting cells in the uterine stroma possess some inherent quality which allows them to undergo this decidual change.

Another rather interesting point which I wish to make is the presence of so-called dysmenorrheal casts such as are found in membranous dysmenorrhea. The finding of such a cast must not confuse and lead to an erroneous diagnosis of extrauterine pregnancy. The etiology of these casts is still undetermined. They differ from the casts found in the extrauterine pregnancy in that they are as a rule neither as large, as thick or as complete. Histologically, they also show definite variations from the casts found in tubal pregnancy. The decided decidual reaction is missing though there may be suggestive areas in the casts. The degenerative changes are more advanced.

DR. EMIL NOVAK, (closing).—In one of our cases we had an opportunity of verifying a point brought out by Dr. Polak in his recent paper, to the effect that if a curettage be repeated in those cases where the embryo is alive, a decidual reaction will be found to have re-formed in the uterus. This indicates that the decidual change is merely the result of some influence emanating from the embryo.

Dr. Polak asks whether or not it is possible for the decidua to regress to a resting condition without any actual casting off. This is of course a possibility which has always been discussed in connection with this question. We were not able to convince ourselves that such a shrinking process occurred in any of our cases. I am inclined to think that there is always some loss of tissue, although there is no doubt that there are marked individual variations as to the amount of tissue thrown off.

Dr. Rubin mentioned the fact that occasionally, even though the embryo is alive, certain traumatic influences may cause some bleeding. This was illustrated by a case which we mentioned in our paper, in which the patient, under the impression that she had an intrauterine pregnancy, had repeatedly introduced an orange stick into the uterus for abortifacient purposes. The possibility that the bleeding, in cases of extrauterine pregnancy, is due to the functional influence exerted by the corpus luteum, must be borne in mind, although, in the present state of our knowledge, we can only speculate on such factors. Several hormone elements may be concerned in the mechanism of the bleeding, i. e., the embryo itself, a possible separate influence of the fetal trophoblast, and the corpus luteum.

Dr. Geist's statement that the tube does not show a decidual change because of the character of its connective tissue is of course in accord with the usual accepted opinion. This brings up the whole question as to whether or not decidua can be formed by non-müllerian tissue, a matter which was thoroughly considered by Webster in his studies of placentation. The question is also a pertinent one in connection with the recent investigations of Sampson, as we have indicated in our paper. A uterine cast is occasionally noted also in con-

nection with membranous dysmenorrhea. The structure of these casts is different from that of the decidual casts which we have discussed in our paper. In membranous dysmenorrhea the process is evidently one in which the uterine mucosa at the time of menstruation is thrown off *en masse* instead of in smaller portions, as is common. Instead of decidual tissue such casts are made up of the degenerated and infiltrated upper layers of the endometrium.

DR. J. T. GWATHMEY (by invitation) presented a paper entitled **Modified Rectal Analgesia in Obstetrics.**<sup>1</sup>

The first slide, the most important of the series, showed that, when 6 per cent ether in a normal saline solution was injected into the internal saphenous vein of the albino rat, the average anesthetic dose was 744 mg. per kg. of body weight, but that the minimum lethal dose was over  $2\frac{1}{2}$  times 744 or 1892 mg. per kg. of body weight, indicating a wide margin of safety. When a 6 per cent solution of magnesium sulphate was given, using the same technic, the average anesthetic dose was 185 mg. per kg. of body weight, and the average minimum lethal dose was 190 mg. per kg. of body weight, showing a margin so narrow that it would be unsafe to use magnesium sulphate alone as a general anesthetic. If, however, a 6 per cent ether and 6 per cent magnesium sulphate solution in normal saline is given, the average anesthetic dose is 170.8 mg. per kg. of body weight, and the average minimum lethal dose is 344.4 mg. per kg. of body weight, i.e., the lethal dose is over twice the amount of the anesthetic dose, giving a wide margin of safety.

If this combined anesthetic dose, 170.8 mg. per kg. of body weight (ether 6 per cent,  $\text{MgSO}_4$  6 per cent), is analyzed, we get the following result:

	: 85.4 mg. ether = 11.48 per cent anesthetic dose ether alone (744
170.8 mg. :	mg. per kg.)
	: 85.4 mg. $\text{MgSO}_4$ = 46.16 per cent anesthetic dose $\text{MgSO}_4$ alone (185
	mg. per kg.)
	<hr/> Total 57.64 per cent of combined calculated anesthetic
	dose (296.32 mg.)

Therapeutically,  $11.48+46.16=100$  instead of 57.64, (definite synergism).

The toxicity of ether and  $\text{MgSO}_4$  in combination is a simple summation of the toxicities of the two compounds as the following table will show:

	: 172.2 mg. ether = 9.1 per cent M.L.D. ether alone (1892 mg. per
344.4 mg. :	kg.)
	: 172.2 mg. $\text{MgSO}_4$ = 90.6 per cent M.L.D. $\text{MgSO}_4$ alone (190 mg. per
	kg.)
	<hr/> Total 99.7 per cent of combined calculated M.L.D.
	(345.4 mg.)

From these results we may conclude that ether and  $\text{MgSO}_4$  act synergistically in producing anesthesia without producing any increase in

<sup>1</sup>The method has already been fully detailed in previous papers published in this Journal, October, 1923, August, 1924, and the procedure is merely reviewed here, based on the most recent observations, in a series of tables shown in lantern slides.

toxicity. Other slides would indicate that a  $2\frac{1}{2}$  per cent solution of novocaine added to the  $\text{MgSO}_4$  solution (50 per cent) or to the  $\text{MgSO}_4$  and morphine solution, increases the efficiency, definitely prolongs the effect, and allays irritation, without increasing the toxicity.

In obstetric analgesia, magnesium sulphate is not used as an anesthetic but as an analgesic and as a potentiating agent for the ether, the amount usually not over approximately one-nineteenth the fatal calculated dose. The toxicity of magnesium sulphate as used in this system need not be considered.

The next four slides demonstrated the even evaporation of ether from oil. The average anesthetic dose of ether in oil is five ounces; the average dose for analgesia is two and one-half ounces. As the patient is never so relaxed that the jaw has to be held forward or the tongue manipulated, an expert anesthetist is, therefore, never necessary.

Quinine is safe in all stages of labor and is just as important as the ether and the magnesium sulphate. If withdrawn, uterine inertia, delayed labor, and an increase in the incidence of forceps results. The average results in a number of cases are better with twenty than with ten grains, although ringing in the ears and temporary deafness (not over four hours) occasionally result.

Morphine is used sparingly and in small doses.

The technic has been changed but little, (see AM. JOUR. OBSTETRICS AND GYNECOLOGY, Oct., 1923—Aug., 1924), since the first one hundred cases and is as follows: When the cervix is two to three fingers dilated, and the pains are four to five minutes apart, and lasting thirty to forty seconds, give an intramuscular injection of morphine gr.  $\frac{1}{6}$  in 2 c.c. of a 50 per cent magnesium sulphate solution with  $2\frac{1}{2}$  per cent novocaine. If effect of hypodermic is not markedly sedative in twenty minutes, place patient on left side and, with gloved finger in rectum, direct the end of a catheter filled with oil beyond the fetal head or buttocks, and give as retention enema:

Rx Quinine hydrobromide	grains 20
Alcohol	drams 3
Ether	ounces $2\frac{1}{2}$
Olive oil q.s. ad	ounces 4

Additionally, if necessary, 2 to 4 hypodermic injections, 2 c.c. of 50 per cent  $\text{MgSO}_4$  solution with  $2\frac{1}{2}$  per cent novocaine, without morphine.

Until June 1, 1924, the cases were selected. Since that time all patients who are not too far advanced in labor receive the treatment. The percentage of cases, for the entire hospital, receiving treatment in June was only 7 per cent; in November it was 66 per cent.

Cesarean or forceps cases present no contraindication as the woman

is relieved of pain and energy is conserved. It is useless to give the treatment if the head is showing, as analgesia will come on too late to be of any service. Not only do all ward patients not too far advanced receive the treatment, but surgeons without exception prescribed it for their private patients. Over 90 per cent of the patients are relieved of pain. In a few instances, the baby is born without the mother's knowledge, but "painless childbirth" for the many is still an ideal to be striven for. At this time, over 200 patients receive treatment every month.

An analgesic chart, composed of the things in which De Lee and other authorities stated twilight sleep failed, is used at the Lying-In Hospital. The following is a summary of over 200 cases analyzed for November, 1924:

1st hypo effect:	Sedative	123	
	Unchanged		53
	Exciting		3
Instillation:	Retained	194	
	Irritated		1
	Expelled		13
Effect of enema and hypo:	Sedative	177	
	Unchanged		17
	Exciting		6
Contractions of uterus:	Not affected	125	
	Increased	37	
	Decreased		32
Sensation of pain:	Decreased	168	
	Not affected		24
	Increased		6
Delivery	Without forceps	141	
	With forceps		36
Do occipitoposterior positions rotate normally?	Yes	22	
	No		7
Condition of baby:	Crying	158	
	Apneic		24
	Asphyxia		4
Postpartum contraction of the uterus:			
	Good	105	

The Lying-In Hospital now has a total of over one thousand cases thus treated. From a study of the charts, we may conservatively state that:

1. The method is safe.
2. Pain is relieved in some measure in over 90 per cent of all cases.
3. Labor is not delayed.

4. Occipitoposterior positions rotate in about the same proportion as without medication.

5. The baby is usually born crying.

6. Delivery with forceps is decreased.

7. The postpartum contraction of the uterus is good.

With our present technic, chance is eliminated. The instillation is rarely expelled, the final result depending entirely upon the experience with this method and the judgment of the obstetrician.

#### DISCUSSION

DR. B. C. HIRST.—There is a persistent demand among women for the amelioration of the pains of childbirth and any proposition along this line should command our careful attention. When the whole country was excited over "twilight sleep," Mr. Bok visited me, after having visited DeLee of Chicago, Williams of Baltimore, and Cragin, of New York, saying that the *Ladies' Home Journal* was flooded with letters from women all over the country demanding to know what was in this method, and the tenor of all the letters was the same, namely, that physicians were showing too much indifference to the pains of childbirth and their mitigation. I have lived through all the recent propositions to lessen the pains of labor and have tried them all. I had an extensive experience with "twilight sleep" as early as 1903 but found it too dangerous. There were too many cases of postpartum hemorrhage, too many asphyxiated babies. I had considerable experience with "twilight sleep" as modified by Krönig and Gauss, about 90 per cent suggestion and 10 per cent analgesia. Various artifices which were practiced in "twilight sleep" such as darkening the room of the patient, blindfolding the eyes, stuffing the ears with cotton, the use of rubber-soled shoes by the attending obstetrician and other methods of suggestion to make the patient believe she was suffering no pain. My experience in Freiburg where this method of analgesia was used made me believe that the women were so overawed that they were afraid to admit that they were suffering. I was therefore dissatisfied with it and gave it up. When therefore this proposition of Dr. Gwathmey's was published I adopted it as promising better success. After a trial for about a year I can say it is the only method for ameliorating the pains of labor that I find practicable in private practice.

To summarize our experience with it, without giving statistics, I would say that it is not so successful in ward patients as it is in private room patients. It is not so easy to keep the former quiet, they are disturbed by other patients about them, the students in attendance and so on. In a private room it is a great comfort to the patient and myself. I am free from the importunity of the patient, the husband and the family. As one of my nurses said recently it converted a wild cat into a reasonable woman. It is really surprising to see the effect on private patients under the influence of rectal analgesia. They are as a rule apathetic and make no complaints and are somnolent four or five hours. The only disadvantage I have seen with this method has been in an unexpectedly rapid labor in which the initial hypodermic of morphine was given too short a time before the delivery of the baby. In one case of breech presentation, for example, in an elderly primipara, anticipating hours of labor, the morphine was given at the proper time but in an hour and a half the baby was born asphyxiated and was revived with difficulty. On the contrary in another breech presentation lasting four days I hesitated to repeat the process. It would be interesting to hear from Dr. Gwathmey how often we could safely repeat the administration of the entire procedure. In some cases the method could be

employed three or four times over with advantage to the patient and the physician as well. How often would it be safe to repeat it after the effects of the first administration have passed away? On theoretical grounds it would appear to be perfectly practicable to repeat it every six or seven hours, but I would like to have Dr. Gwathmey's opinion on that point.

DR. ASA B. DAVIS.—I am particularly glad that Dr. Hirst is here to give us the result of his observations and experience, and that he is able to confirm the value of this method.

Nearly two years ago Dr. Gwathmey came to me as chief of the Lying-In Hospital, to discuss the matter of developing some method which would reduce the pains of childbirth. After several conferences between us, I consented to place the facilities and clinical material of the Lying-In Hospital at his disposal, with the one stipulation that he should keep well within the danger line in so far as the mother and child were concerned. I believe that that requirement has been lived up to strictly and entirely, as I have yet to know of a case wherein either mother or child were in any way injured by this method. Dr. Gwathmey began in 1923. I feel that it is impossible to give him too much credit for his initiative in this matter, his persistence, patience and the employment of his great skill and knowledge of anesthetics. Our frequent consultations have continued up to the present time, in order to check up the results of the medication and the clinical reaction of the patients, until we have arrived at a method which is very near a standard. We believe that in this respect something has been discovered which is of very great value in obstetrics. This has not just happened. It is the result of Dr. Gwathmey's efforts, plus the facilities and team work of the Lying-In Hospital, extending over a period of nearly two years. There has been much experimenting and frequent changes in the formulae. The Chief Surgeon in directing the clinical end of this investigation, has constantly laid stress on the point that we should find out what was wrong with this method all the way along. We felt that the good points would appear and take care of themselves. There is no doubt that we have been successful far beyond our expectations. Whatever the results are elsewhere, we have found this method so good that it will be continued in the Lying-In Hospital. At first, when the drug content was purposely very small and results were nil, or nearly so, it was very difficult to secure cooperation and make use of the ample clinical material. This has changed, and I believe that the attending staff, internes and nurses are as one in their enthusiasm. To some extent we are at a disadvantage in changing our interne staff every four months, and for a time it was difficult to induce the new men to take up this new work readily. Now, its reputation is established, and its employment has become part of the routine of the Hospital. The patients themselves have no doubt concerning its value. It does work. It is safe. It does reduce suffering to a very marked degree. It does not act equally well in all cases. We have some failures as Dr. Gwathmey has indicated, but, the percentage of failures is decreasing. There is scope for a certain amount of skill in its administration and the exercise of judgment as to when it should be given and also as to its repetition. Dr. Hirst has pointed out these facts. As he states there is no objection to repeating the whole procedure in long drawn out labors. We see very few cases where labor is stopped. One possible objection occurs to me. We are now using 20 grains of quinine in each installation. It might not be desirable to keep on repeating this same dose of 20 grains. This objection could be overcome by having the mixtures which are prepared for repeating contain a lesser quantity, say 10 grains. Harking back to "twilight sleep"; blue babies were altogether too common following its use. Occasionally we still see babies who

are cyanotic after delivery. We see them in cases where no medication has been used. After critical observation we have failed to find that blue babies are traceable to the use of the method now in use. There are some things on record which we consider very unfortunate. It is our aim to avoid appearing in the lay press. In some way we have stumbled, and this method has been heralded abroad in the papers as "painless childbirth." In this age when so many inventions, changes and wonderful things have occurred, it is hardly safe to use the term "never" concerning any problem. But, in so far as I can see, we cannot look forward to the time when childbirth shall be entirely painless. I do not believe that the delivery of a child can be carried out without pain. I wish to repudiate as definitely and strongly as possible, the statement that we have discovered something which will render childbirth painless. This has appeared in the lay press and been published all over the country, with the result that hopes have been created which cannot be realized. We have been severely criticized for an article which appeared on the front page of one of the papers during the Clinical Congress which took place here last Fall. I have Dr. Gwathmey's written statement that he had nothing whatever to do with this article and was not present at the meeting from which it was said to have emanated. I am very sure that no information of this kind was given out by anyone connected with the Lying-In Hospital. The article had to do with scopolamine, "twilight sleep" and various other things. The very construction of the article should have carried its own denial. If it were our wish to gain this kind of notoriety, it would take but a short time to obtain at least as much advertising as "twilight sleep" had. Sensational reports in the lay press are cheap and not helpful.

We propose to continue experimenting. Already many changes have been made, but we find that for the best results we are obliged to go back to the process which is almost standard.

DR. HAROLD BAILEY.—I have been converted to the use of this analgesia after a considerable period of trial. At the Manhattan Maternity Hospital we have been using it more or less regularly for some time and last month there were 40 cases.

I think it is well named "analgesia" because in most instances it is exactly that. Many of the cases sleep through the labor some of which, as Dr. Hirst says, end in a remarkably short time. We gave the anesthesia to a primipara the other day as soon as the three minute pains began (she was examined and found to be three fingers dilated); she went to sleep and had a stillborn baby, without our knowledge, under the sheet, sleeping through the delivery, of which she knew nothing. She was in the waiting room next to the operating room and under constant supervision. She made no cry and we merely found the baby in the course of our observations.

These cases must be watched, especially if they drop into sound sleep although some 50 per cent of them do not. A certain percentage are excited rather than quieted by the analgesia and it is difficult even to keep them in bed.

We have varied a little, for one or two reasons, the method of administration and have not been quite accurate in the time of giving the second dose; in other words, timing the dose of ether we give the morphine without the magnesium sulphate because 2 c.c. of magnesium sulphate two or three hours before the ether has very little effect on the ether anesthesia. As we look at it now knowing, of course, exactly what the doctor is doing at the Lying-In Hospital, we use the morphine more with the idea of finding out whether the labor is progressing; if so we give the ether in an hour and if not we wait until the pains become severe again. We have had some remarkable successes

in this way. As a matter of fact the patients who are excited, the next day when they are questioned say that the analgesia was a great relief.

There is another point, namely the question of the absorption of the quinine by the rectum. It seems to me that that is a flourish and is hardly necessary, but I should like to hear from the doctor in regard to it.

The ether is put into the rectum without any great difficulty and, as a rule, it seems to be retained. It is allowed to run in by gravity with a little warm olive oil first.

I am a great believer in the method and I certainly intend to use it in all my own cases unless I find a contraindication to its use and at present, I do not know of any.

DR. J. A. HARRAR.—As Dr. Davis says, we are not trying to be too enthusiastic about this method, but are trying to find out its faults. It seems to have very few serious faults. I think there is no question as to its being the best practical method we have for the relief of pain in labor. It takes the place in a simple way of the method of gas-oxygen in the last three or four hours of labor. If given too soon in a primipara it will temporarily stop the labor. If given before the pains are four to five minutes apart and lasting forty seconds, it will sometimes favor an interrupted labor so it will stop and begin again some hours later.

We often repeat the method. We had a thirty-two hour labor the other day in a breech presentation in which we gave one-sixth of a grain of morphine one four hours, with a standard dose of the instillation the next four hours, with perfect success as far as relieving the pains was concerned.

It does not give an absolutely painless labor, but it controls two-thirds of the pains.

Occasionally there is a little burning, if there is a fissure-in-ano, which usually passes off very shortly and lasts only a few minutes after the instillation.

It is simple to use: the nurse or the accoucheur can use it. It does not require a trained anesthetist and a man working in a home has a good method for the relief of the pains of labor without anybody helping him.

It does not interfere with the bearing-down pains like "twilight sleep" did. It does not interfere with the perineal stage. The patient delivers her baby promptly with good bearing-down pains throughout.

The use of quinine seemed unnecessary and I asked Dr. Gwathmey to go ahead without it. The result was that the number of forceps increased and there was a delay in the perineal stage.

In regard to the question of the quinine being absorbed by rectum, I would say that these patients frequently complain of ringing in the ears so there must be absorption.

DR. HAROLD BAILEY.—I would like to ask the reader of the paper another question concerning this second dose. We have to give ether to most of these cases at the actual delivery and we have noticed that it takes very little ether to put the patient very deeply under, even if the anesthesia is given six or seven hours before, and we cannot help but wonder whether under those circumstances another dose is safe. I have also heard it remarked by others, and this we have noticed ourselves, that in one or two cases the pulse rate is very high at the end of the delivery, much higher than one would expect even in the case of a nonoperative delivery.

DR. GWATHMEY (closing).—There is no danger in repeating a fraction or all of the instillation after four hours. This has been done numbers of times. When ether is given by colon, the physiology is entirely different from inhalation



anesthesia; the spinal nerves seem to be affected to a much greater extent, and analgesia is much more apparent. When ether is given by rectum, you do not get the nausea and vomiting that you do with ether by inhalation. In using the rectal method we are able to talk to a patient who is satisfactorily analgized and get correct answers. You cannot do that with a patient under inhalation anesthesia.

I have given this instillation to a parturient woman with hemorrhages from the lungs with no ill effect whatever, because when it gets to the lungs it is moistened and warmed to body temperature and has no irritating effect.

Dr. Bailey referred to the quinine in the mixture. There is no question about its absorption for the simple reason that sometimes we get the toxic effect, i. e., ringing of the ears and headache. One case was deaf for three or four hours, and then it cleared up. We took the quinine out of the formula in thirty cases at the request of one of our attendings, and during that time uterine inertia and the incidence of forceps increased, the labor was delayed, and the method was more or less of a failure. When we put the quinine in the formula again, things went on as smoothly as before. There is not the slightest question as to its being absorbed from the rectum.

The percentage of success will always be greater in private practice than in ward cases, for the reason that in the ward one patient disturbs another and you cannot have the quiet that you have in a room. The private patient co-operates and is willing to do what you ask; she has confidence in the doctor, whereas with ward patients it is sometimes the reverse.

The success of the technic depends upon when the first hypodermic and the instillation are given. Even with much experience, one will sometimes fail as to the time.

Albuminaria or the toxemias of pregnancy do not contraindicate the method. In one instance an out-patient who looked as if she were going into eclampsia received it before the attending saw her; she was sent in to the Hospital, and it cleared up without further treatment.

# OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF MARCH 6, 1924

THE PRESIDENT, DR. EDMUND B. PIPER, IN THE CHAIR

DR. J. S. LAWRANCE read a paper entitled *The Relation of Extraneous Disease to the Incidence of Eclampsia*. (For original article see page 351.)

## DISCUSSION

DR. PHILIP WILLIAMS.—Dr. Lawrance shows very clearly how poorly a damaged organ can stand the strain of pregnancy. It seems to me that he regards pregnancy as a disease which is physiologic in its onset, normal in its termination and convalescence and yet susceptible to many complications. Careful history-taking is just as necessary as in any obscure medical problem, and when we have by the history-taking determined the possible damages to which the organ has been subjected by previous infection or pathologic entity, we then should introduce the proper physical and laboratory examination to determine to what extent the tissues have suffered in their struggle with bacteria. In some cases of toxemia perhaps the toxin is brought through a placental infarct disintegrating, due to chronic sepsis of many years standing. In other cases a focus of infection in the teeth, tonsils, gall bladder, quickened by the action of pregnancy, may result in acute thermic types of toxemia of pregnancy. Or it may be true that nephritis from scarlet fever in childhood or myocardial heart following rheumatism, may dam back the normal waste to a point of irritation. At any rate I think we can rest assured that whatever weakness we find we can often carry such a damaged body through the strain of several pregnancies by care and attention. Eclampsia is certainly a diminishing disease in Philadelphia as judged by the hospital reports. The toxemia of pregnancy in its milder, or possibly somewhat severe form may be a little more frequent as a result of the strain of present-day life. It does seem that all three of the types of toxemia could be reduced by more careful prenatal care, by more careful history-taking and more careful laboratory and physical examination of the women. Dr. Lawrance's paper has served to show how necessary such work is, what it can accomplish and I think the survey that the Child Federation made of the prenatal clinics in Philadelphia showed that we need a great many more of these clinics. I would like to add one little note in regard to the treatment of eclampsia. A case which came under my observation lately, showed a history of typhoid infection eleven years previous to pregnancy. During this pregnancy her blood pressure ran consistently high and she developed a fulminant toxemia two days before the expected date of delivery. Cesarean section was done and a living baby recovered. The blood pressure consistently increased from 195 to 210 or thereabouts, venesection was done and eight ounces of saline introduced into the woman's veins. As the condition grew worse we did a transfusion, but we did another venesection just as we were prepared to do the transfusion, working on the theory which had been found successful in superficial burns, that if toxins are extracted by venesection and healthy fluid put in, the toxins are taken out while the fresh blood is being given. We bled the woman again, sixteen ounces, and as she became exsanguinated, we ran in from a suitable donor 600 c.c. of blood. Her condition steadily improved, the blood pressure dropping

gradually from 220 to 150. She remained in comatose condition for three days. Except for a slight retinitis she is now perfectly recovered.

DR. LEONARD AVERETT described his experience with the **Kielland Forceps** as follows:

During ten months' work in the clinics of Mackenrodt and Bumm in Berlin and of Kermauner (formerly Wertheim's Clinic), in Vienna, I had ample opportunity to observe and learn the use of the Kielland forceps. In the Kermauner Clinic the superiority of the Kielland forceps is so established that their application is now being taught the University students in the regular curriculum.

Since my return I have used the Kielland forceps in nine cases, four of which were high forceps deliveries, with excellent results in all but one. In this particular case I was called in consultation after the woman had been in labor for twenty-four hours. On examination I found a large child with the head presenting but not engaged. She had a true conjugate of about 7.5 cm. Realizing that the disproportion between head and pelvis was too great, I advised cesarean section. The physician in charge insisted that I try forceps first. I used the Kielland forceps but could not pull the head into the pelvis. Thereafter, on sectioning her, I found no injury to the uterus or the child's head, except for some pressure marks of the blades which disappeared very shortly. Both mother and child made a good recovery.

My associate, Dr. Sangmeister, has become an enthusiastic advocate of this instrument, and uses it not only in the high position of the head, but in all cases where forceps are indicated. He reports six cases of which two were high forceps deliveries, with very good results in all.

#### DISCUSSION

DR. WILLIAM E. PARKE.—Since last fall I have made seven applications. The method demonstrated by Dr. Averett is new to me. I applied the Kielland like other forceps and not with the first blade wrong side up, and then to be turned. I had a rather curious experience with this forceps. I applied them in the usual way, presumably to the sides of the head. The handles when locked were in an anteroposterior position but when I pulled on them the head slipped out, not from the end of the forceps, but from the concave side. A second application resulted in the same way. I then terminated the delivery by podalic version. I suppose the blades were not applied biparietally or this accident would not have occurred. The technic demonstrated this evening should correct this error.

DR. PHILIP F. WILLIAMS.—Just why does the forceps have to be turned upside down in the uterus and then turned over? It seems to me if you put the forceps in with tips turning up towards the uterine wall, there might be danger of rupture of the lower uterine segment.

DR. G. VICTOR JANVIER.—I believe that this forceps should be used only by experts, a great deal of damage may be caused by the general practitioner, for not only the fetus, but the mother is in jeopardy. These forceps should be decried outside of a regular maternity clinic. They have their place and are going to be used as we acquire more skill in using them.

DR. NORMAN L. KNIPE.—I should like to ask, as Williams did, why it is necessary to put these forceps on upside down? Personally I do not use forceps very much any more. I make use of them only as elevators at the outlet. If the case is one which would ordinarily require forceps on a head higher up, I have other methods of delivery, most frequently version.

DR. NORRIS W. VAUX.—The application of these forceps is so different from the way we were taught that I am glad to hear Averett demonstrate the method used in the Vienna school. We were taught never to put forceps on the head at the brim, the floating head. It strikes me these forceps are more for rotating, than for traction.

DR. AVERETT (closing).—In a high presentation of the head, with the sagittal sutures in the transverse, to apply the anterior blade directly over the parietal bone with the old method, would be impossible, as the perineum would not permit the handle of the forceps to be brought down low enough. The direct application of the forceps over the parietal bones is its chief advantage and if applied in any other way than that which I have demonstrated, the biparietal application will not be obtained.

DR. ROY W. MOHLER presented a paper entitled **Foreign Proteins as Adjuvants in the Treatment of Stubborn Pelvic Infections.** (For original article, see page 365.)

#### DISCUSSION

DR. JOHN A. MCGLINN.—In my cases of chronic sepsis at the Philadelphia Hospital, we followed the original German way of using milk, which was brought to the boiling point and then given in 5 to 10 c.c. doses. These patients had violent reactions. In one there occurred a temperature of 110°, with edema of the glottis. The second patient had a "frozen pelvis" and after three injections her uterus was entirely movable and we continued with the treatment. We continued the treatment not only in the Philadelphia Hospital and St. Agnes, but in private work and had remarkable results. We subsequently used proprietary preparations the basis of which is lacalbumin, and we do not get the violent reactions, but do get the same results. It has been pointed out recently that the reactions depend upon the number of bacteria in the milk. If you use certified milk you will not get the reactions that you get in ordinary milk. You can use certified milk and practically be as free of reactions as if you used lacalbumin. It does not make any difference what protein we use. All contain something which has not yet been isolated, but that something does the good.

DR. LEONARD AVERETT.—At the Philadelphia General Hospital I used it in six cases, two, acute pelvic cellulitis and four, subacute. In two of the subacute cases, the smears were positive for gonococci. The acute cases were very much benefited by this treatment; the temperature came down, the pain and tenderness subsided. They were soon able to go home, but their pathology was not entirely cleared up.

The four subacute cases all cleared up and the two with positive smears became negative.

# NEW ORLEANS GYNECOLOGICAL AND OBSTETRICAL SOCIETY

MEETING OF DECEMBER, 1924

DR. A. H. GLADDEN, JR., reported the case of a colored woman, aged 33, operated at Charity Hospital a few days before on a diagnosis of lacerated cervix and multiple fibroids. Laparotomy was done, and on exploring the upper abdomen a *lithopedion* was found attached to the omentum; there was also a calcified area attached to the end of the right tube. About a third of the omentum was excised and the lithopedion removed without difficulty. When the question of possible pregnancy was put to the patient after her recovery from the anesthetic, she recalled that some 14 years before she had considered herself pregnant, but at the seventh month further growth apparently stopped. The local physician explored her uterus and found nothing but blood clots, and the idea of pregnancy was dismissed. Shortly afterwards she menstruated normally and her menstrual life thereafter was without incident. Gladden exhibited the specimen together with photographs and x-rays, and reviewed briefly D'Aunoy's and King's recent exhaustive report of the 80 similar cases found in the literature. This case will be reported in detail later.

DR. E. L. KING read a paper on the **Conservative Treatment of Eclampsia**. (For original article, see page 338.)

## DISCUSSION

DR. W. D. PHILLIPS.—My only adverse comment would be on his very high fetal mortality. I believe that in this condition the baby must be considered as well as the mother. Naturally the situation in hospital and in private work is very different. In the hospital most often we get the patients in a hopeless condition, many of them having been tampered with on the outside, while in private practice such a situation rarely arises for the reason that we watch our cases carefully and treat them before they reach that stage. In the pre-eclamptic state, blood pressure and urinary findings are both important guides, though it is perfectly possible for a patient to develop eclampsia with a relatively low blood pressure and practically normal urine. But as a rule the reverse is true. The duration of pregnancy will help considerably in deciding what steps to take. In my private work, when the patient is bordering on eclampsia and the child is viable I do not temporize too long. It is too easy to induce labor and the chances of mother and baby are certainly better. If the patient is having pains and her toxemia is not very severe, it is safe to temporize, but in a primipara advanced in pregnancy and already in the eclamptic state, cesarean section is often indicated. In multiparae less far along in pregnancy vaginal cesarean section gives good results, or podalic version, when the cervix is dilated or dilatable. Personally I have had excellent results with catheters in the induction of labor.

DR. P. B. SALATICHI.—I agree with Dr. Phillips that if you watch your cases carefully the percentage of true eclampsias is likely to be small. As the condition is most likely to develop in the last two months, it is my rule to advise patients after the seventh month to send their urine every five to seven days. This is very little extra trouble for me and often prevents serious trouble for them. Most of the bad cases I have seen have been in consultation. If there is a history of con-

vulsions and the patient is a primipara and not in labor, with a high blood pressure, I reduce it to 130 or lower, not by bleeding but by medical means. I give veratrum viride, 3 to 5 minims, which usually brings down the blood pressure and checks the convulsions. I follow this with high saline or bicarbonate flushes, and then a purgative, and after the bowels have moved well I dilate the cervix slightly and put in a bag. I also use quinine, about 10 gr., after the bag is in place and the pains have begun; it promotes contractions and has no effect on the blood pressure. I am afraid of pituitrin under these conditions. I recall one patient whose convulsions had been checked for ten hours by veratrum viride. The doctor associated with me suggested the application of forceps; I proposed pituitrin instead and gave her two minims. She had a convulsion almost immediately, whereupon I applied forceps and terminated the labor without further difficulty. With the use of quinine and traction on the bag I have had multiparae deliver within two hours.

DR. HILLIARD E. MILLER.—Practically every case which develops it is a neglected case. It frequently comes relatively early in pregnancy and I think Dr. King has been rather more radical in the cases he reports, which are all early ones, than he would have been in cases nearer term. In the latter group, in the majority of instances, labor begins spontaneously, and then nothing more is indicated than the conservative measures already discussed, no tampering of any sort, no vaginal examinations, no instrumentation during the first stage, and as early a forceps delivery as possible during the second stage. My experience with pituitrin in the induction of labor in eclampsia is disappointing. I use it without fear in other conditions where it is indicated, such as postmature babies, borderline pelvis, etc., but I do not think it makes any difference what you give eclamptic patients by hypo because they are already so edematous and water-logged. I do not think it is a good policy to use quinine in obstetric cases. You will note meconium very early when you use it, as the oxytoxic is a distinct protoplasmic poison and causes early embarrassment of the baby. I should like to ask Dr. King whether he has noted that the use of glucose increases the urinary output.

DR. J. W. NEWMAN.—The time is ripe for the conservative treatment of eclampsia, though we must not allow the pendulum to swing so far that we become ultraconservative. There are one or two points I should like to stress. We give gr.  $\frac{1}{2}$  morphine at once, then gr.  $\frac{1}{4}$  every 15 minutes until the patient is completely under, almost anesthetized, and then we begin treatment. We seldom have to give more than a grain. We have brought the respiration as low as six, then worked on the patient and got ten good results. I also want to stress the use of purgatives. We use two or three ounces of Epsom salts in concentrated solution after a gastric lavage. We also rely a good deal on the Rehfus tube. After it passes the pylorus you can do practically anything in the way of treatment or nourishment. If enough of the salts has not been retained, we give it by drip through the tube, in a weaker solution, if the patient's condition does not warrant the stronger one, and in that way we give fluids too. For years I have advocated pituitrin in these cases and have had good results from its use. In Dr. Salatich's case I think the convulsion was purely coincidental. Pituitrin does not raise the blood pressure more than a few points, and it does start contractions. Used with the bag it saves the patient much suffering, which is certainly a point to be considered. There is no doubt that in the future the whole treatment of the toxemias is to be along the line of the endocrines. In the preeclamptic stage we are treating our patients with ovarian, thyroid and pituitary extracts. In past years the mistake has been that we used too heavy a dosage. Today we try to stimulate the internal secretions, not replace them; we begin with small doses and increase them until we secure the effect we wish.

DR. E. L. KING (closing).—I wish to point out that I did not attempt to cover the entire field of eclampsia in my paper, and that I was not discussing pre-eclamptic conditions particularly. The treatment has rightly been stated to be prevention first of all, and I think we should be considerably more careful than the average textbooks direct, with a urinalysis and blood pressure determination every two weeks during the last two months of pregnancy. A patient can get eclampsia and die and have the funeral during that period. I have seen the blood pressure jump 50 points in six hours and mine jumped along with it. The first case I reported in this series was a private one. Her blood pressure and urinary findings were normal on Thursday and she had the convulsion on Sunday. Our hospital cases have many of them been examined by a doctor or midwife within two weeks of admission, and the midwives particularly cannot understand how the condition developed since they were all right when last seen. Prenatal care will eliminate most of these cases but it will not prevent them all.

Dr. Phillips raised the question of the high fetal mortality. In explanation I would say that only two babies in this series were at full term and they were both dead on admission, probably from the toxemia; the others were premature, from six and one half to seven months. We will certainly have a higher fetal mortality if we handle every case by the expectant treatment, and in some instances, particularly primiparae at term with live babies, an occasional cesarean section is justified, but as a routine procedure it carries a very high maternal mortality. We have not been very successful in temporizing in the pre-eclamptic conditions; 99 per cent demand some sort of interference. In reply to Dr. Miller's question as to the effect of glucose infusions on the urinary output, I think it increases it. I have had no personal experience with *veratrum viride* either in the hospital or in private work. We use traction on the bag occasionally, especially in placenta previa, and we find it sometimes helps. I have not used quinine to accelerate labor after induction for eclampsia; the patient's stomach is usually upset and I am doubtful whether very much is absorbed. I agree with Dr. Newman that pituitrin does no harm and that its effect on the blood pressure is of no particular importance. I have never used as much morphine as he does; one grain in nine hours has been my limit. That is more than Williams advocates, though I have never understood his insistence on the smaller quantities. Dr. Miller stressed as little manipulation as possible in the first stage; I agree with him; I think we overtreated the last case I reported. Now we let the patients rest and we get better results.

DR. W. E. LEVY, presented a case which he described as an "obsterical museum." The patient was a white primipara, aged twenty-four, and a moron, who had pre-eclamptic toxemia, a borderline pelvis, a medical induction of labor, a low forceps delivery followed by a complete tear, pyelitis and septicemia.

While debating how to deliver this patient because of her borderline contraction while she developed pre-eclamptic toxemia, with a blood pressure of 172 and a heavy trace of albumin. She was admitted to the hospital Oct. 31, 1924, and in spite of rest in bed, diet, purgation and other accepted measures failed to improve in any way. Therefore on the fifth day after admission, when she was about eight months' pregnant, labor was induced by medical means (castor oil, quinine and pituitrin), partly because of the increasing toxemia and partly in the hope of delivering a viable child by natural means. Twelve hours later she went into hard labor and was delivered by low forceps after an episiotomy. A complete tear resulted which was immediately repaired. The child weighed seven pounds and was in good condition.

Four or five days before delivery she had had pus in a catheterized specimen of urine but not enough to justify a diagnosis of pyelitis of pregnancy. Twenty-four hours after delivery her temperature rose sharply to 105° and over, and the

rise was so abrupt as to make us suspect an aspiration pneumonia. Two examinations by an internist were entirely negative, but a catheterized specimen (bladder) was found to be loaded with pus. We then considered the temperature to be due to the previous mild pyelitis which had become acute under the strain of labor. The bladder urine was exceptionally foul, the left kidney normal but the right barely functioning. *B. coli* were present in the specimens from both kidneys. In spite of continued treatment the acute condition persisted.

A blood culture was taken, which showed a colon bacillus infection, and was corroborated twenty-four hours later. About this time Gellhorn's article on non-specific protein therapy was brought to my attention, and as the patient did not respond to other measures we decided to employ this treatment. We gave her 5 c.c. of ordinary boiled ward milk. There was no reaction, but three days later a second injection was followed by a chill and temperature rise to 104.6°. Her condition was fair for a couple of days, then grew bad again, and we gave her a third injection without results. Blood cultures were persistently positive. Several days later, when she failed to improve, we decided to use Young's technic for the intravenous injection of mereurochrome. We estimated that she would require about 19 c.c. and gave her that amount. She had a hard chill, which we controlled with morphia, and a terrific diarrhea next day as well as considerable soreness of the gums, but for the first time her blood culture was sterile and forty-eight hours later a second culture was still sterile. Her temperature went down steadily and four days later was normal. She was rapidly improving when she suddenly decided to go home and no persuasions could keep her in the hospital. She left Dec. 4, 1924 with a normal temperature, a sterile blood culture, and a well-healed tear with a normally functioning sphincter.

It is fortunate that in this case we did a medical induction of labor. If we had used catheters or a bag we should certainly have had to consider the infection as primary and the pyelitis as secondary. I cannot agree that quinine and pituitrin are not successful in the induction of labor, as we use it successfully in from 60 to 75 per cent of all our cases. As to the mereurochrome, it must have done the work. The patient had a violent reaction and immediately afterwards she had a sterile blood culture for the first time. I know that many authorities say that *B. coli* septicemias will get well of themselves if you let them alone, but this one was getting steadily worse.

DR. P. B. SALATICH.—Such a violent reaction makes me feel that possibly a milder solution might be effective. It is logical to suppose that if you use half the amount you would have half the reaction. The violent reactions and ugly salivations reported after the administration of mereurochrome should make us use it very cautiously.

DR. W. D. PHILLIPS.—I agree entirely with what has been said about most colon infections getting well if you let them alone. I am interested in the possibility of the entrance of infection in this case through the complete laceration. I have had two or three similar cases develop very ugly infections.

DR. E. L. KING.—I have had very little experience with mereurochrome and am glad to hear a case reported in which it has been effective. I tried it in one case at Charity in which the blood culture was negative but in which the diagnosis was unmistakably septicemia. The patient had a chill which lasted an hour. The woman was very sick then and had a violent diarrhea, and it took us about a week to get her back to her original very poor condition. It certainly did her no good. Perhaps we should have repeated it, as I think Young recommends, but I was so thoroughly disheartened with the original results I could not contemplate a second dose.



DR. J. B. HEBERT.—I should like to ask Dr. Levy if he intended to give his patient a second or even a third dose if there had been a recurrence of the chills and high temperature? I have treated one case with mercurochrome and with good results. About three months ago I had a case of infection following pregnancy in a bicornate uterus, which gave me a great deal of anxiety. The patient was having the typical septic chills and high temperature and was a very sick woman. About seven days after the onset of the condition, I gave her 25 c.c. of one per cent solution, based on her body weight. She had a fairly strong reaction, but not a very violent bowel disturbance. A chill 48 hours later was followed by a second dose of mercurochrome, after which her recovery was uneventful. Admitting that the policy of noninterference with reference to active local and general measures is possibly the most popular treatment for these conditions, I should like to point out that the two negative blood cultures reported by Levy cannot be overlooked.

DR. J. A. LANFORD.—Various dyes have been used in the treatment of septic processes, the dosage being based always on laboratory and experimental tests. Gentian violet, for instance, is quite deleterious to the growth of all Gram-positive cocci, especially the staphylococcus, and therefore it is used in septic processes due to that organism. Certain other dyes have a more marked effect on the growth of Gram-negative organisms, to which the colon bacillus belongs. The use of mercurochrome is therefore selected for this group. This drug also retards the growth of the streptococcus. For the rational use of this type of medication you must determine very definitely your type of infection; if this is done, good results will follow more uniformly. Promiscuous injections will do more harm than good.

DR. W. E. LEVY (closing).—I think it is the germicidal action of mercurochrome which is effective as milk, which is a nonspecific protein, also gave a violent reaction. Replying to Dr. Hebert, we did not intend to give the patient any more mercurochrome as long as her blood cultures remained sterile and as long as she was getting well symptomatically as well as biologically. Unfortunately she left the institution and I am not sure that we can get her back, but she certainly left with a sterile blood culture and a normal temperature. I do not think the infection was due to the tear, as she was running temperature before delivery and had some pus in her urine. You do not need many pus cells to put the case down as pyelitis. One of the worst cases of prepartal pyelitis I ever had, simulated appendicitis. She came in with high temperature, pain, nausea and a leucocytosis. She had only a few pus cells but the cystoscoped urine from the right ureter came out under pressure and her "appendicitis" was cured. Which reminds me that many patients come to operation for appendicitis who really have pyelitis. In the prepartal type mechanical drainage is all that is necessary. Washing out the pelvis of the kidney with an antiseptic solution in my opinion is wrong. The pelvis is already dilated and we dilate it many times more, the compressed epithelium is already suffering from anemia, to which we are adding a mechanical irritation. We have cystoscoped some 16 or 17 cases who developed pyelitis before delivery, left the catheters in 6, 8 or even 24 hours, putting them on the side opposite the affected kidney in order to remove the pressure of the gravid uterus, and they have all gotten well. In postpartal pyelitis in the acute stage I do not hesitate to give large doses of urotropin. Recently I had a severe case of postpartal pyelitis at the Mercy Hospital; I gave her urotropin for four days and she had a perfect recovery. I have had five or six similar cases at Touro.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

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### THE OBSTETRICAL LITERATURE OF 1924

BY J. P. GREENHILL, B.S., M.D., CHICAGO, ILL.

AS in previous years, the obstetric literature of the year 1924 deals largely with conditions, the etiology of which or the treatment of which are still matters of controversy. Eclampsia remains "the disease of theories" and the strife continues between those who favor radical therapy and those who prefer to be conservative. The treatment of placenta previa likewise remains a bone of contention; but in central Europe at least, cesarean section is being favored more and more for this condition. Operative obstetrics in general is being assailed and warnings are sounded that we are making labor pathologic in far too many instances. The increased number of cesarean sections has called forth great indignation; but on the other hand, some individuals want to extend the indications for this operation still more. Further, among those who perform cesarean section there is no unanimity as to the best type of operation. The vast majority of operators in this country prefer the classic, while the minority here and the vast majority in Germany, Austria, Hungary and Switzerland prefer the transperitoneal cervical operation. In addition, throughout the literature there are many papers which elaborate and re-emphasize the everyday problems in obstetrics not only for the general practitioner but also for the specialist.

#### PREGNANCY

In a study of the human fallopian tubes during the menstrual cycle and pregnancy, Snyder<sup>1</sup> observed periodic changes which involved the height of the epithelium and the morphology of the nonciliated cells. The cyclic changes in the tubes are closely parallel chronologically to the alterations in the endometrium during the menstrual cycle. Pregnancy inhibits the cyclic alterations and the epithelium remains in the condition which is found in the premenstrual phase.

In recent years the interesting fact has been established that the spontaneous contractions of the uterus as well as of the fallopian tubes show periodic variations in relation to the ovulation cycle. Wislocki and Guttmacher<sup>2</sup> observed peristaltic contractions of the musculature of the freshly excised internal genital tract of the sow and they believe their observations further substantiate the suggestion that the tubal and uterine contractions play a rôle in the transportation of

ova through the tubes into the uterus and the final spacing of the blastocysts in the uterus before implantation.

The problem of sterility has always been a difficult one to solve for the obstetrician and the gynecologist. In recent years the Rubin test has been a great aid in helping to find the source of sterility in some cases and in curing sterility in others. Meaker<sup>3</sup> is of the opinion that there is a definite group of sterile women in whom the fallopian tubes are not sealed by adhesions and yet there is difficulty in forcing air through the tubes. He believes the factor which prevents the passage of the gas in these cases is a spasm of the sphincter-like circular muscle of the interstitial portion of the tube and recommends that benzyl benzoate be administered to these patients before the insufflation. If gas passes through the tubes after the use of benzyl benzoate in patients in whom gas could not be forced through the tubes without the drug, then such patients should take benzyl benzoate post-coitum. Stapler<sup>4</sup> believes there is some direct connection between the tonsils and the gonads and reports 14 cases in which pregnancy followed a tonsillectomy in previously sterile, young, married women. Macomber<sup>5</sup> divides the causes of sterility into four groups, namely, developmental, congestive, infective and constitutional. One-quarter of sterile women owe their sterility to developmental defects and these may be prevented by making mothers understand the dangers of overtaxing the nervous and physical powers during puberty and particularly during menstruation. Many cases of sterility of congestive origin are due to irregularities in the marital habits. Attention to diet, general hygiene, exercise and elimination of all possible foci of infection are important in the prevention of sterility and in recent times, nerve strain has become a definite cause of sterility or of low fertility.

Naujoks<sup>6</sup> takes up the question of temporary sterilization in women and as indications mentions heart disease, pulmonary tuberculosis, Basedow's disease, acute nephritis, pyelitis gravidarum, psychoses and hyperemesis gravidarum. In the literature are descriptions of twenty-three different operations devised for the purpose of producing temporary sterilization in women. In spite of the numerous operations performed there have been but two reported attempts to restore fertility and only one was successful. On the other hand, after many of the sterilizing operations the patients became pregnant. Because of this and because of the technical difficulties involved, the author favors the use of x-ray for the purpose of producing temporary sterility. Twenty-nine patients with pulmonary tuberculosis were sterilized in this way and no bad effects were noted. The only drawback is the inability to regulate definitely the duration of the sterility.

In a discussion of the childbearing possibilities of women after gynecologic operations, Polak<sup>7</sup> points out that 60 per cent of gynecologic lesions are the direct result of poor obstetric practice. In an effort to cure these women and others too many operations are performed. The curette, which is used so commonly, has but two purposes in Polak's clinic—that of removing secundines from the uterus in aseptic, incomplete abortions before the eighth week and for diagnosis to determine the cause of bleeding in uterine hemorrhage. Sterility operations not only give poor results but often have unfortunate sequelae. This is particularly true of the curette, dilator, and stem which not only leave the woman childless but produce a chronic pelvic inflammation with a train of new symptoms. The Sturmdorff opera-

tion has been disappointing because after it, abortion has been more frequent, leucorrhea was not always cured and not infrequently cervical dystocia complicated labor. Theoretically suspension of the uterus should have no ill effects on childbirth but practically it necessitates a large number of cesarean sections. When possible, operations on the childbearing woman should be deferred until she is finished having children.

Peterson<sup>8</sup> has found roentgenography a valuable aid in making a positive diagnosis of pregnancy before the other positive signs are present. With his present technic he has been unable to obtain a fetal skiagram before the end of the third month. From a study of 22 cases it was found that at least one-half of the roentgenograms should be positive from the fourth to the fifth month and all should be positive beyond this period.

Combined abortion and sterilization operations were performed by Dützmänn<sup>9</sup> on 69 patients without a death or complication. The operation was performed as follows: After making an ordinary colpotomy incision, the peritoneum was opened, the uterus drawn forward and an opening made in it just above the internal os. After removing the ovum and packing the uterus the tubes were cut and the ends buried in the broad ligament. The uterine incision was then closed and a vaginal fixation operation performed, thus making the uterine incision extraperitoneal.

In a series of 1000 cases of abortion studied by Hillis,<sup>10</sup> there were 20 deaths (2 per cent) of which 16 followed criminal abortion. Conservative treatment gave better results than active therapy in the febrile cases. Gordon<sup>11</sup> studied 961 cases of abortion, of which 18 died (1.9 per cent) and in this series also conservative treatment was the procedure of choice.

It is the belief of Keller<sup>12</sup> that the origin of hydatid mole lies in a malformation of the blood vessels of the chorionic villi and is characterized by a diminution in the number of blood vessels, by a lack of continuity in the branches of these vessels and by underdevelopment of the capillaries.

Daly,<sup>13</sup> who has been conducting a medical clinic in connection with the Chicago Lying-In Hospital and Dispensary discusses the heart in pregnancy. Among 4040 patients 117 showed heart disease. Of these only one died and less than 3.5 per cent suffered damage. The author's experience with these patients has led him to believe that nearly every woman with organic heart disease can carry through pregnancy successfully. Prevention of trouble should be begun early in pregnancy, not at term. Delivery from below after spontaneous labor with ether anesthesia affords the easiest and best means of terminating labor in those patients who have no obstetric complications. Herrick,<sup>14</sup> also an internist, emphasizes that medicine may contribute to obstetrics in the care of three general classes of patients, namely, those presenting infections, those with cardiac insufficiency and those with toxemias. As a general rule in the management of infections, the pregnancy is largely ignored and every effort should be made to prevent abortion during the acute stages of a serious infection. In the treatment of cardiac disease during pregnancy, the latter is ignored and the attention is concentrated upon maintaining cardiac efficiency. The average pregnant cardiac patient responds to medical measures as well as the nonpregnant. The toxemias of pregnancy are divided into those asso-

ciated with renal insufficiency, those with cardiovascular instability and those with focal infections.

Among 118 parturient women in whom mental diseases occurred, Gregory<sup>15</sup> found that manic depressive psychosis appeared 52 times. The great majority occurred during the puerperium, but this disease frequently occurs independent of the puerperium and in many cases its occurrence here is purely incidental. Other mental diseases which appeared in this series were dementia precox, epilepsy, psychosis with intellectual inferiority and mental deficiency and cases of infective exhaustion. The author insists that the term "puerperal insanity" is a misnomer and if permissible at all should be limited to the group of infective exhaustive psychoses because here only is there a direct relationship.

As a cause of unfecund marriage, the gonococcus stands easily in first place according to Schumann.<sup>16</sup> There is a commonly accepted belief that the gonococcus is an active cause of puerperal sepsis but this in the author's opinion is subject to grave doubt. Pregnancy in an untreated syphilitic may eventuate in the birth of a living and healthy infant in about one-half of the cases. If adequate treatment is employed, a woman may expect the birth of a healthy child with slightly greater chances of fetal mortality than had she not suffered from the disease at all.

Among 349 colored pregnant women observed by King,<sup>17</sup> there were 59 positive Wassermann reactions (16.9 per cent) and among 52 of these there was a fetal mortality of 46 per cent. The incidence of positive Wassermann reactions among 326 white pregnant women was 2.4 per cent. Bartholomew<sup>18</sup> found three times as many abortions and premature labors and 17 times as many stillbirths in the syphilitic as in the nonsyphilitic patients he studied. Prenatal treatment resulted in one-half as many premature births, one-third as many stillbirths, one-seventh as many abortions and one-ninth as many infant deaths up to ten days as compared with the untreated cases. According to Belding and Hunter<sup>19</sup> only one-third of the fetal deaths in serum-positive syphilitics are due to syphilis. In prenatal examinations the sources of information have the following values in the detection of clinical syphilis: history 52.5 per cent, husband 20 per cent, clinical symptoms 17.5 per cent and evidence in previous children 10 per cent. The proportion of living children to total conceptions averages 69.7 per cent in women with a negative Wassermann, 59.1 per cent in those with positive reactions and 29.7 per cent in those with clinical syphilis. Syphilis is responsible for 27 per cent of all previous fetal deaths in women with positive Wassermann reactions and for two-thirds in clinical syphilitics. The proportion of fetal deaths due to syphilis must be between 5 and 7 per cent.

A study of maternal syphilis made by Cruickshank<sup>20</sup> for the British Medical Research Council revealed an agreement between the reaction of the mother's blood and that of the child in 94.9 per cent. In this series all the children who at birth gave a negative Wassermann reaction continued to do so from 10 to 20 months afterwards; but the great majority of those who at birth gave a positive reaction gave a clearly negative reaction when examined from three weeks to twenty months afterwards. This shows that the Wassermann reaction in the

newborn is of little value in proving the presence of congenital syphilis. In most cases a positive reaction in the infant's blood at birth is due to the transfer of reacting substances to the fetal blood. These facts and the clinical examination of the infants in this series indicate that the incidence of congenital syphilis has been exaggerated by most recent writers and the estimates of less than 1 per cent are nearer the truth. There was no greater incidence of abortion in the positive group than in the negative one. Stillbirths occurred with only slightly greater frequency among the syphilitic women; but premature births were decidedly more frequent among those with positive Wassermann reactions. There was in addition a greater mortality among the Wassermann-positive babies in the first few months of life.

Ekehorn<sup>21</sup> is of the opinion that syphilitic endometritis is very common among women suffering from syphilis. He maintains that once the disease has been established in the fetus it remains uninfluenced by treatment of the mother. This is due to the entire or almost entire lack of resistance of the fetal powers against infection.

Löhlein<sup>22</sup> examined the fields of vision in pregnant women and found during the last four weeks a constant and definite bitemporal diminution in the field of vision. The greatest limitation was present at the time of labor and was found in 78 per cent of the gravidæ examined. All the patients showed a definite improvement about the tenth day postpartum and in 80 per cent of the primiparae the fields had returned to normal at this time. In multiparae there remained a definite and permanent limitation of the fields of vision. This phenomenon is due to hypertrophy of the hypophysis which occurs during pregnancy. Very rarely is there such a degree of limitation in the fields of vision that the patient notices it. Holm,<sup>23</sup> on the other hand, examined 45 pregnant women and found the field of vision diminished in only one patient.

To speak of the glycosuria so regularly found in pregnant women after the ingestion of a large amount of glucose as a renal diabetes or as an alimentary glycosuria is not justifiable according to Ehrenfest<sup>24</sup>; for the pregnant woman shows a weakness in her sugar metabolism only in a distinct lowering of her ability to assimilate properly one large dose of carbohydrates, glucose, levulose or even starch. The cause of the glycosuria is most likely a prompt lowering of the renal threshold, required during pregnancy as a protective measure in the face of greatly accelerated sugar metabolism. From the clinical point of view pregnancy may be responsible for the development of diabetes mellitus but the latter presupposes impaired pancreatic function antedating impregnation. Ehrenfest reports a case of diabetes mellitus which began during pregnancy and he outlines the diagnosis and treatment of this disease during gestation, emphasizing particularly the value of insulin. Springer<sup>25</sup> studied the question of diabetes in pregnancy from the point of view of oversized babies for which he believes the diabetes is responsible. He reviews the literature and adds two cases of his own. One patient had no diabetic symptoms and only a trace of sugar in the urine during pregnancy, yet one month after delivery she died in diabetic coma. This case and that of Ehrenfest show that a true diabetes mellitus may arise during pregnancy. On the other hand, Lublin<sup>26</sup> reports three cases of diabetes mellitus which followed a favorable course during pregnancy.

It is generally believed that specific therapy for malaria during pregnancy has a deleterious effect on the pregnancy. However, Deromps<sup>27</sup> is convinced of the absolute necessity of administering quinine intensively for malaria during pregnancy, because malaria kills fetuses and produces abortions, because it may be transmitted to the fetus *in utero* and during labor may produce a febrile reaction and especially because quinine affects the uterine musculature only during labor and does not stimulate contractions as long as the cervix is closed. Only about 18 per cent of women with malaria go to term because pregnancy is interrupted by the febrile reaction and by the death of the fetus. Intensive quinine treatment will prevent much of this.

In an effort to reduce polyhydramnios Commandeur and Banssillon<sup>28</sup> gave a patient hypertonic saline solution (3 per cent) intravenously and noted both subjective and objective improvement.

To the 16 cases of renal tuberculosis associated with pregnancy reported in the literature, Stevens<sup>29</sup> adds two of his own. Like tuberculosis in general, tuberculosis of the kidney is deleteriously affected by pregnancy. Regardless of the pregnancy, nephrectomy is indicated as soon as the diagnosis is made, if the infection is limited to one kidney; for pregnant women stand nephrectomy well. Pregnancy is permissible if the remaining organ is free from tuberculosis and functioning normally after a period of two or three years. As regards tuberculosis of the genitalia in women, Fruhinsholz and Feuillade<sup>30</sup> believe that if a cure is produced medically or surgically, pregnancy may follow. Occasionally genital tuberculosis and pregnancy may develop simultaneously with or without bad effects or the disease may start postpartum. Sometimes local symptoms are produced and at other times a general miliary tuberculosis results. The child is often born tuberculous and dies within a few months. The reviewer a few years ago studied 200 cases of tuberculous salpingitis which occurred at the Johns Hopkins Hospital and found that 60 per cent of the married patients had been sterile. Approximately one-fourth of the patients attributed the onset of their symptoms to some uterine activity, such as menstruation, pregnancy or miscarriage.

It is not likely that gestation favors the appearance of acute appendicitis for if this were so, Vignes<sup>31</sup> asserts more cases of acute appendicitis would occur among pregnant women. It is likely, however, that pregnancy has a bad effect on those women who have previously had attacks of acute appendicitis and should appendicitis develop during pregnancy operation is indicated just as in the nonpregnant state.

Pernicious or hemolytic anemia of pregnancy which occurs during the latter months of pregnancy and the puerperium has a high mortality in the initial attacks but does not recur if the patient survives. Rowland<sup>32</sup> reports a case which recovered. Early recognition is essential and if the course is progressive, pregnancy should be terminated.

Eight patients with pernicious vomiting of pregnancy have been successfully treated with insulin combined with intravenous administration of glucose by Thalhimer.<sup>33</sup> Lequeux, Weill and Laudat<sup>34</sup> also report a case of pernicious vomiting treated with insulin. For similar cases Miller<sup>35</sup> strongly advocates the use of luminal of soda and at-

tributes the successful results to the release of the pylorospasm which he believes is largely responsible for the trouble.

It is well known that after x-ray treatment especially in the region of the head, many patients complain of marked dryness of the mouth. This observation led Biermer<sup>36</sup> to use the x-ray in an attempt to check temporarily the function of the salivary glands in a patient with ptyalism of pregnancy. The patient who had been treated by various means, including psychotherapy and atropin, was subjected to the x-ray and the salivation rapidly subsided. Pregnancy continued to term without any complication.

Blood chemistry studies were made by Stander<sup>37</sup> during pregnancy and it was found that the nonprotein nitrogen as well as the urea nitrogen content is less than in the nonpregnant woman. The uric acid is about the same as in the nongravid person, while the carbon dioxide combining power drops. In neurotic vomiting the figures show an increased value for the nonprotein nitrogen and uric acid in the severe cases. The nonprotein nitrogen increases in nephritic toxemia but the increase is not so striking in the preeclamptic type of toxemia. In true eclampsia normal values are found for the nonprotein nitrogen and the carbon dioxide combining power. Uric acid is definitely increased in all three types of toxemia, nephritic, preeclamptic and eclamptic. Bunker and Mundell<sup>38</sup> found that chemical analysis of the blood in eclamptic patients yielded normal results; but every case of nephritic toxemia showed nitrogenous retention. Greenhill<sup>39</sup> pointed out that similar blood chemistry studies made at the Chicago Lying-In Hospital on patients with toxemia yielded no more information than was obtained clinically. Likewise the investigations of Plass<sup>40</sup> have led him to believe that blood chemistry studies are at present of little or no practical assistance in the clinical management of toxemic cases and that the older methods of examination, urinalysis, blood-pressure readings and ophthalmoscopy yield the most valuable information concerning the patient's condition. Plass<sup>41</sup> also points out that the period of immediate convalescence from the late toxemias of pregnancy is usually associated with higher plasma nonprotein nitrogen values than is the period of the most acute clinical signs. This blood-nitrogen rise is synchronous with a fall in the plasma protein percentage, which indicates a plasma dilution. King and Dennis<sup>42</sup> found an accumulation of uric acid in eclamptic and preeclamptic toxemia but could not make a differential diagnosis between hepatic and renal toxemia.

Baer and Reis<sup>43</sup> believe that capillary microscopy especially when associated with methylene blue and "freshet" tests gives another method that should prove of value in the differential diagnosis of the kidney of pregnancy and true nephritis complicating pregnancy; whereas Smith<sup>44</sup> believes that definitely abnormal retention of phenol-tetrachlorophthalein in a patient with toxemia of pregnancy suggests that the toxemia is a severe one and that it is of the preeclamptic rather than the nephritic type. An accurate estimate of the practical value of this test must await further investigation.

A temporary but decided loss of central as well as temporal vision amounting to practical blindness at times has been noted in occasional cases of toxemia of pregnancy. No gross renal, blood or obstetric pathology is found in such cases, but Mills<sup>45</sup> attributes the con-



dition to an acute obstructive renal stasis and edema or to the direct effect of relatively excessive pressure upon the optic nerve system or a combination of these factors. Symptoms, such as headache, nausea, vomiting and epigastric distress hitherto assumed to be preeclamptic, may arise from local intracranial pressure of the hypertrophied pituitary and from increased pituitary function. Cheney<sup>46</sup> likewise studied the toxemias of pregnancy from the ophthalmologic standpoint and stresses the importance of routine examinations of the fundi. Observation of toxemic patients will reveal the cases in which labor should be terminated; for fundus changes are found only in the severe cases.

The classic belief is that fetal death in cases of toxemia of pregnancy is followed by an amelioration of symptoms. Powilewicz and Morace<sup>47</sup> analyzed 94 cases at the Baudeloque Clinic and found that 23 patients with toxemia improved after the death of the fetus but in 71 patients the albuminuria persisted up to the time the dead fetus was expelled. Miller<sup>48</sup> submits evidence in favor of accepting the hypothesis advanced by Young in 1914 as to the importance of placental infarction in the etiology of the toxemias of the latter months of pregnancy. Young professed to show that the late toxemias resulted from absorption of products of early degeneration of a piece of placenta, the blood supply of which had been cut off. Miller attempts to show that in patients with placenta previa in whom subsequent to placental detachment delivery is sufficiently long delayed to allow development of infarction, symptoms of toxemia arise.

In a series of 465 cases of toxemia studied by Bunzel,<sup>49</sup> labor was induced in 100. Of the 54 convulsive cases there were six maternal deaths and 28 fetal deaths. For the entire 465 cases there was a maternal death rate of 3 per cent and a fetal death rate of 28 per cent. Kellogg<sup>50</sup> calls attention to a group of patients who show no clinical manifestation of chronic nephritis when not pregnant but who present symptoms of kidney insufficiency during each pregnancy. To this group he gives the name "recurrent toxemias of pregnancy."

The treatment of eclampsia is still the subject of much controversy. Stroganoff<sup>51</sup> has recently again come forward with his conservative method of treating eclampsia. He outlines the procedure in detail and states that of 2208 reported cases of eclampsia treated by his method the total mortality was 9.8 per cent. Out of 253 cases treated under his own direction, the maternal mortality was only 2.4 per cent. Beek<sup>52</sup> and his colleagues have likewise refrained from interfering with the pregnancy in eclampsia. Reliance is placed upon large doses of morphine and massive phlebotomy. In 30 patients treated conservatively the mortality was 16.6 per cent, while in 18 cases not so treated the mortality was 22.2 per cent. Among 253 cases of eclampsia studied by Heinlein<sup>53</sup> there was a mortality of 7 per cent for those treated conservatively and 23.3 per cent for those treated actively; but almost half of the latter were treated with Bossi dilators.

Among the advocates of active therapy in eclampsia are Fürst<sup>54</sup> who reports a series of eclamptics operated upon by the low or cervical cesarean section without a single maternal death and of the 31 viable children in the series there were only 2 deaths. Wagner,<sup>55</sup> another advocate of the transperitoneal cesarean section for eclampsia, claims the results of the treatment by operation are not so good as they might

he because usually the decision to do a cesarean section is made late and the operation is reserved for critically ill patients who have been treated by other measures. The duration of the anesthesia and operation and the after-care are important. Of 19 transperitoneal cesarean sections performed by the author for eclampsia not one patient died. Hagens<sup>56</sup> likewise advocates emptying the uterus in severe cases of toxemia.

In one of the most important papers of the year, Harris<sup>57</sup> discusses the after-effects of the late toxemias of pregnancy. One hundred and eleven patients who had had toxemia during pregnancy or labor returned for further study one year after they had left The Johns Hopkins Hospital. The study shows that we are not justified in assuring those who have suffered from eclampsia or preeclamptic toxemia that they may face future pregnancies without fear of toxemia complications. Furthermore, the length of time the toxemic symptoms persisted seems to be a factor in determining the occurrence of permanent renal damage. This is of special interest in the management of preeclampsia as many patients with this complication are brought into the hospital, kept at rest, placed upon restricted diet and subjected to methods supposed to promote elimination. In view of the facts presented, it seems pertinent to inquire whether we may not seriously increase the chances of permanent renal injury by allowing pregnancy to continue too long. Permanent renal damage is much more likely to follow preeclamptic toxemia than eclampsia. When the signs and symptoms of toxemia persist for three weeks or longer after delivery, the chances of not having permanently damaged kidneys are minimal. The danger of chronic nephritis following preeclamptic toxemia is great (60 per cent in this series).

Frey<sup>58</sup> reports the seventh case in the literature of the association of hydatid mole and eclampsia. The association proves that eclampsia may occur in the absence of a fetus.

In a discussion of the question of obstetric shock versus severe toxemia, Schickel<sup>59</sup> insisted that every case which presents symptoms of obstetric shock and terminates fatally should have a careful autopsy to exclude all possible lesions, especially pregnancy toxemia. He does not believe there exists a single instance which might qualify as a case of obstetric shock analogous to surgical shock which is produced by large wounds with secondary absorption of toxic elements from the wounds.

#### LABOR

Renewed interest has been shown in the DeLee-Hillis head stethoscope as evinced by the publications of Falls and Hunter,<sup>60</sup> and Moss<sup>61</sup> who have modified the original instrument and of Bartholomew<sup>62</sup> who likewise extols the use of the instrument in the early detection of fetal asphyxia.

For economic reasons many people use rubber finger cots in making rectal examinations. Bacteriologic examinations made by Theodor<sup>63</sup> of the uncovered portions of the hand after rectal examination showed numerous bacteria to be present. Pathogenic as well as nonpathogenic bacteria were found, hence rubber gloves should be used in place of finger cots. Reis<sup>64</sup> found that of the patients in labor who had been examined vaginally 47 per cent remained afebrile, of those who had been examined rectally 45 per cent remained free of fever, while of

those who had no examination at all 56 per cent had no elevation of temperature. Pelvic infections occurred in 5.9 per cent of those examined vaginally, 6.3 per cent of those examined rectally and 4.7 per cent of those not examined internally at all. The author feels that at least one vaginal examination is desirable in every case of labor.

According to Druskin,<sup>65</sup> induction of labor is a justifiable procedure at any stage of pregnancy when the health or life of the mother is in danger. In contracted pelvis induction after the thirty-sixth week compares favorably with cesarean section and for this purpose the colpeurynter proved 5.25 times as reliable as the catheter.

In a consideration of the conduct of the second stage of labor, Greenhill<sup>66</sup> emphasizes that in addition to a policy of watchful expectancy other factors must be considered. These are the matter of asepsis and antisepsis, anesthesia, protection of the life of the child, and preservation of the perineum.

For several years at the Long Island College Hospital the almost forgotten abdominal binder as a substitute for pituitary extract in the second stage of labor has been used. Beck<sup>67</sup> informs us that the special binder used shortens the second stage, diminishes the need for forceps and reduces the fetal mortality. Burger<sup>68</sup> claims that pituitrin in his hands is successful in 80 to 85 per cent of cases of primary and secondary uterine atony, slight cephalopelvic disproportion after complete dilatation of the cervix and fixation of the head and placenta previa lateralis after rupture of the membranes. He claims to have completely eliminated the use of high forceps by this drug. Jacoby<sup>69</sup> is of the opinion that 0.2 c.c. of pituitrin is as effective as 0.5 c.c. and advocates the use of this drug early in labor and with frequent repetition. Steinberg<sup>70</sup> believes pituitrin is indicated in prolonged labor, uterine atony and fetal complications, provided there is a normal pelvis, the head is engaged and the cervix completely or nearly completely dilated. To him any indication for forceps is an indication for pituitrin. Opposed to these favorable reports is the statement by Williams<sup>71</sup> that he has practically abandoned the employment of pituitary extract in the second stage of labor and resorts to operative delivery instead. He believes that in the hands of inexperienced persons pituitrin will do more harm than good. On the contrary, the drug is invaluable in the treatment of atonic hemorrhage following the third stage of labor. Williams cautions against the use of pituitrin to hasten the expulsion of the placenta as it may give rise to an hour-glass contraction of the uterus. This has not been the experience at the Chicago Lying-in Hospital where pituitrin is almost routinely given immediately after the child has been delivered. Pituitary extract combined with castor oil and quinine to induce labor has given Williams satisfactory results in more than 80 per cent of the cases.

Gwathmey, McKenzie and Hudson<sup>72</sup> report 200 additional cases where labor was made painless by the use of magnesium sulphate given hypodermically and ether mixed with oil administered through the colon. With the first dose of magnesium sulphate, morphine is given and in general a high degree of efficiency is obtained. Heaney<sup>73, 74</sup> extols the use of ethylene-oxygen in obstetrics but cautions that care must be exercised to prevent explosions.

A case of delayed chloroform poisoning recently occurred in the obstetric department of The Johns Hopkins Hospital and Stander<sup>75</sup> reviews this and three other cases which occurred in that clinic. Three

of the four patients died. All four patients underwent operative delivery lasting one hour or more and from two and a half to four ounces of chloroform had been administered. It is advisable to prescribe a diet rich in carbohydrates and milk and restricted in fats before giving chloroform.

In France a new analgesic drug, somnifène, has recently been used. Riss<sup>76</sup> found that the drug was not toxic in the doses employed and that its analgesic action is undeniable but not constant. Because of the violent agitation which results, patients who receive this drug should be in a hospital under careful supervision. Dujol and Clément<sup>77</sup> claim that somnifène acts more as an anesthetic than as an analgesic and that it makes the patients appear toxic.

From observation of 182 cases of dry labor, Brodhead<sup>78</sup> concludes that dry labor should be attended by no harmful results either to mother or child in the absence of abnormal conditions, such as contracted pelvis, relatively large child, malpresentation, prolapse of the cord, etc.

A study of his own cases and a review of the literature convinced Abernethy<sup>79</sup> that direct delivery of the shoulders by traction on the body in breech deliveries as first described by Müller, yields better results than the usual method of delivering the shoulders by releasing the arms.

Among 13,907 cases of childbirth studied by Häggström,<sup>80</sup> there were 71 instances of prolapse of the umbilical cord, an incidence of 0.51 per cent. In the series there were five times as many multiparae as primiparae and in 24 per cent the pelvis was contracted. In only 66 per cent of the cases was there a head presentation and the average length of the cord was well over 70 cm. There was a fetal mortality of 36.6 per cent. To treat prolapse of the cord Monash<sup>81</sup> devised a repositor made of fabric-reinforced rubber and having the form of a hollow elliptical ring with a long tail tube.

In the Second Woman's Clinic in Vienna among 72,000 labors there occurred 65 cases of brow presentation or 1 in 1108 births. Stiglbauer<sup>82</sup> tells us that most of the babies were larger than normal and that 25 babies delivered spontaneously, of which 19 were born alive. Of the 40 delivered by operative procedure 37.5 per cent died. The Kielland forceps proved especially valuable and the author believes these forceps will save many babies and make cesarean section in some of these cases unnecessary.

Vogel<sup>83</sup> believes a Bandl's contraction ring is favored by premature rupture of the membranes, by intrauterine manipulations and by primary, irregular and painful uterine contractions. The dystocia produced by Bandl's ring is dangerous to the babies since most of them die during labor. Narcotics are to be used when the ring is a part of a general state of contraction of the uterus but where the ring is isolated, local mechanical dilating measures are best.

From a case of complete severance of the spinal cord which occurred during pregnancy and from experiments performed by Warren, Good<sup>84</sup> concludes that the sympathetic nervous system and not the spinal cord controls uterine contractions. A patient may have the spinal cord completely severed and give birth to a baby normally and painlessly. Perfectly normal healing of the uterus and abdominal incision will take place if a cesarean section is performed.

Injury to the rectum is not an uncommon result of childbirth. J. C.

Hirst and Wachs<sup>85</sup> point out that in labor the patient who most often suffers from this injury is a primipara with a justo minor pelvis whose coccyx had probably been injured in an accident and whose labor is terminated by forceps. Every patient should be treated palliatively until six months after injury, to give the bone a chance to ankylose. When palliative measures fail, operation is indicated.

The incidence of bacterial invasion of the uterine contents during labor by examining bacteriologic smears from the fetal part of the placenta and from the cord was undertaken by Goldsborough and Roman,<sup>86</sup> who feel that with about 25 per cent of positive microscopic findings it is perhaps not unsafe to conclude that few if any of their placentae were actually sterile.

Among legitimate obstetric operations none has been attended so frequently by air-embolism as procedures undertaken for the purpose of saving the mother's life in placenta previa. In nearly all reported cases version was attempted and at about the time a foot was drawn through the cervix, the patient collapsed and died. According to Gough<sup>87</sup> only one condition is necessary to produce death from this cause, namely, the admission of air in sufficient quantities to the sinuses in the walls of the pregnant or recently delivered uterus. Volkmann<sup>88</sup> states that in the obstetric and gynecologic literature there have been reported 70 cases of venous air-embolism.

B. C. Hirst<sup>89</sup> condemns the axis-traction forceps in no uncertain terms and maintains that a certain degree of injury to mother and child is unavoidable no matter what the skill and experience of the operator.

The Kielland forceps, about which much has been written in the German journals during the last few years, is still the subject of much discussion. Wyder<sup>90</sup> believes the new instrument is a definite improvement in the construction toward an ideal forceps and that it should supplement but not entirely replace the older type of forceps for the specialist. The general practitioner should have only one type of forceps, an old type, and he should know his limitations. Henkel<sup>91</sup> believes that the value of the Kielland forceps while a very definite one, is being violated by errors in judgment regarding its use. Greenhill<sup>92</sup> reports a case of abruptio placentae which occurred during the use of the Kielland forceps and in a Collective Review<sup>93</sup> of the entire literature on the subject of these new forceps, he mentions that the weight of evidence is clearly in favor of the new instrument which differs from the ordinary type of forceps in being lighter in structure, in having a sliding lock and having only an extremely small pelvic curve. Greenhill feels that the Kielland forceps are distinctly helpful when the head is above the spines of the ischia and also when the head is engaged but the occiput is not in an anterior position and cannot be brought into an anterior position manually. Where the head is engaged and the occiput is or can be rotated anteriorly he believes better results can be obtained with the Simpson forceps.

As in previous years there has been an international interest in the subject of cesarean section. In Germany, Austria, Hungary and Switzerland the low or cervical type of operation is decidedly the favorite. In the United States, England, France, Italy and the Scandinavian countries, opinion is divided on the merits of the classical and cervical operations. J. C. Hirst and Van Dolsen<sup>94</sup> emphasize the advantages of the low or cervical cesarean section in patients who have

been in labor a long time, who have been subjected to repeated examinations and in whom the membranes have been ruptured sometimes for days before interference is contemplated. It is in these cases that the classic operation is attended by too much danger. In a series of 107 cervical operations there were two deaths, one from gangrene of the transverse colon and the other from acute cardiac dilatation. Cameron<sup>95</sup> who favors the classic operation attributes a large measure of his success to substituting craniotomy for cesarean section in cases where in addition to rupture of the membranes of many hours' duration there was also a probability of the existence of septic infection resulting from repeated vaginal examinations. After delivery of the child, Cameron inverts the uterus to insure complete evacuation of the uterine contents. Murray<sup>96</sup> lost no mother or child among 43 patients operated upon early with unruptured or recently ruptured membranes; but he lost 10 mothers and 12 babies among 73 patients who were exhausted and infected. All the operations were of the classical type. Foster<sup>97</sup> has modified the classic cesarean operation by sewing the edges of the parietal peritoneum to the uterus after delivery of the child and closure of the uterus. The author claims this permits the formation of a suspensory ligament for the uterus and provides for subsequent cesarean operations without the direct opening of the abdominal cavity. A similar extraperitonealization of the uterine incision after the classic operation is described by Klingenfuss.<sup>98</sup>

A new type of cesarean section has been recently described by Portes<sup>99, 100</sup> for infected cases. After opening the abdomen, the uterus is brought out of the peritoneal cavity and sutured to the abdominal wall all around. After incising the uterus and removing the child and placenta the uterus is closed. It is permitted to remain outside of the uterine cavity for a number of weeks and after the uterine wound has healed and there is no sign of infection, a second operation is performed to replace the uterus into the peritoneal cavity. In addition to four of these operations reported by Portes, two cases were reported by Berson,<sup>101</sup> one by Guéniot,<sup>102</sup> four by Cleisz<sup>103</sup> (with one death) and one by Vaudeseal.<sup>104</sup> This operation is not really original with Portes for it had previously been described by Gottschalk.

On the continent, among those who use the cervical type of operation the vast majority prefer the intra- or transperitoneal type as opposed to the extraperitoneal operation. Huber<sup>104, 105</sup> from a study of some reports in the literature and his own cases, found that of 51 women who had been delivered by the intraperitoneal cesarean section, 28 women delivered per vias naturalis in subsequent labors, while 23 had a second cesarean section. In the majority of these repeated operations the first scar could not be found. The author likewise found that of 36 women who had been delivered by the extraperitoneal form of operation, 17 were later delivered by the natural passages and 19 had repeated cesarean sections; but the second operations were occasionally difficult to perform because of adhesions. Although the above figures prove that the scar in both types can withstand the stress of subsequent labor almost equally well, Huber prefers the transperitoneal operation because of its many advantages.

A. B. Davis<sup>106</sup> performed the extraperitoneal cesarean section in 28 types of presumably infected and mismanaged cases of prolonged labor. There was a maternal mortality of 7.2 per cent and a fetal mortality of 25 per cent. Davis describes a type of patient seen

rather frequently for whom it is advisable to "abuse" cesarean section and do it early when it is comparatively safe for mother and child. The patients are usually of stocky build and appear healthy. Their external pelvic measurements are up to or above normal and the pubic arch may or may not be narrowed; but the pelvic makeup is only one side of the equation. Such patients usually give birth to large babies. They have occiput posterior and early rupture of the membranes and have long labors. Greenhill<sup>107</sup> describes practically the same group of women, designated at the Chicago Lying-In Hospital as the Dystrophia Dystocia Syndrome and mentions the following as characteristic of these women: In the majority there are masculine characteristics or evidences of hypopituitarism and there may be a family history of dystocia. In general, the available space in the pelvis is slightly contracted but not sufficiently to make one think of a difficult labor from this one cause alone. Most of the patients are short and stout and have short forearms and stubby fingers. Many go over term and often the membranes rupture early. The head remains high and the occiput is usually posterior. If attempts are made to hasten labor because progress is slow, the end-result is usually disastrous. For these patients cesarean section is advisable; because while the danger from abdominal delivery is usually greater than delivery from below, when we face the probability of a very difficult vaginal delivery, the delivery from below with its most probable damage to mother and baby does not really outweigh the advantages of a cesarean section. The author prefers the transperitoneal, cervical cesarean section (laparotrachelotomy); for this is decidedly less dangerous than the classic operation.

From 1916 to 1922, Swift<sup>108</sup> informs us, 95 women had repeated cesarean sections at the Boston Lying-In Hospital and 160 operations were performed. This series of repeated operations gave better results than the total number of cesarean section operations performed at the hospital; hence the risk of a repeated cesarean section is less than that of a primary operation.

In a discussion of the subject of uterine scars, Munro Kerr<sup>109</sup> said that the results of the classic cesarean section were unsatisfactory because of the rapid degenerative changes which occur in the uterine muscle, the necessity imposed upon the surgeon of using a ligature for hemostasis as well as to keep the surfaces in apposition and the frequent situation of the placenta on the anterior wall which causes an unsatisfactory condition for the healing of the scar. Kerr, therefore, advocates the use of the incision through the lower uterine segment. McIntyre<sup>110</sup> studied a number of uterine scars after classic cesarean sections and found in most cases that the scar consisted of a considerable proportion of fibrous tissue and that the thickness of the wall in the line of the scar was diminished in nearly every case. In Hendry's<sup>111</sup> series dense adhesions occurred in cases where the classical operation had been performed; whereas when the incision was made through the lower uterine segment there was not a single case in which adhesions occurred in the region of the scar.

Four cases of rupture of the uterus after classic cesarean section are reported by Hillis.<sup>112</sup> All of these occurred during pregnancy and in each case the rupture occupied the site of the previous scar. B. C. Hirst<sup>113</sup> reports ten cases of rupture of the uterus from various causes (contracted pelvis, hydrocephalus, spontaneous, localized necrosis, in-

ternal manipulation, instruments through the vagina, perforation through the abdominal wall, version in a case of placenta previa, perforation of the vaginal wall and imposition of weight on the abdomen).

In their review of the operations for permanent enlargement of the contracted bony pelvis in women, Polak and Phelan<sup>114</sup> conclude that the female pelvis may be permanently enlarged by section of the pubic bones, resection of a portion of the symphysis and resection of the anterior portion of the promontorium; that all of these measures carry with them a definite mortality and morbidity; that with the exception of pubiotomy, clinical experience is too limited to justify their general use and finally until we have additional data as to the fate of permanent enlargement and an improved mortality rate in these procedures, cesarean section will be accepted as a more rational operation. Stone<sup>115</sup> reviews the literature of osteomalacia and reports a case of an American negress in which cesarean section was necessary. Burgess<sup>116</sup> simplifies the classification of contracted pelves by dividing them into four groups, namely, generally contracted, masculine, rachitic and those due to conditions outside the true pelvis. A study of 1935 cases revealed a high percentage of spontaneous deliveries, a high fetal death rate in version and extraction, the comparative safety of cesarean section, and the favorable results of induction of labor. Among 18 patients in whom pubiotomy was performed by Le Lorier<sup>117</sup> there was no maternal death but three patients had suppuration of a hematoma. Two babies died before leaving the hospital.

A case is reported by Forget<sup>118</sup> where injection of the umbilical vein with water to produce separation of the placenta caused a severe chill. The author attributes this to the water which formed a retroplacental hydroma and forced its way into some uterine veins.

According to Depken<sup>119</sup> the treatment of choice in placenta previa formerly was the metreurynter inserted intraovularly; but he now performs cesarean section in the interest of the child and he prefers the cervical operation. Since all the complications in placenta previa are due to overdistention of the site of implantation, Schoenholz<sup>120</sup> believes that the type of therapy chosen should be that which gives one control over the implantation site, which affords opportunity to check hemorrhage, which avoids overdistention of the lower uterine segment and which decreases the likelihood of postpartum hemorrhage. All these are accomplished by the cervical type of cesarean section. In the home, however, the Braxton-Hicks version is the best therapy. Schulte<sup>121</sup> favors the transperitoneal cesarean section for cases of placenta previa after the thirty-fifth week and the vaginal cesarean section before that time. Liebe<sup>122</sup> likewise is of the opinion that operative procedures give the best results for mother and child and he favors vaginal cesarean section also.

Among the cases of placenta previa studied by Lynch,<sup>123</sup> accouchement forcé besides being the most frequent method used was likewise the one fraught with most danger to mother and child. On the other hand, the Voorhees bag placed extraovularly gave the best results. At the New York Lying-In Hospital among 591 cases of placenta previa there was a maternal mortality of 12.1 per cent and a stillbirth rate of 42 per cent. In the series the preference in therapy was given to caure packing followed in most instances by an internal podalic version (354 cases). McPherson<sup>124</sup> points out that no one thing has contributed more to the successful issue in the cases of placenta previa



as far as the mother is concerned than blood transfusion. Rhenter<sup>125</sup> studied 257 cases of placenta previa in which the maternal mortality was 4.6 per cent and the fetal mortality for the severe cases was 80 per cent. Sieben<sup>126</sup> reports a case where a baby with bilateral club-foot and bilateral clubhand complicated placenta previa and perplexed him when he attempted to perform a version and extraction; for he mistook the clubhands for normal feet. Greenhill<sup>127</sup> previously pointed out that the association of fetal monstrosities and abnormalities with placenta previa was not unusual.

Polak<sup>128</sup> is of the belief that ablatio placentae is more frequent than placenta previa. It is possible to differentiate between those cases which can be safely treated on the expectant plan and those which require rapid infrapelvic delivery or laparotomy and hysterectomy. In the majority of tragic cases the unprepared cervix offers an obstacle to infrapelvic delivery; hence after transfusing the patient, an abdominal operation should be performed.

In thirty years of practice Polak has encountered four cases of placenta accreta and he and Phelan<sup>129</sup> show that though rare, placenta accreta is a pathologic entity, the result of an entire or almost entire absence of the decidua basalis which exposes the muscle of the uterine wall to the erosive action of the trophoblasts and penetration of the villi. Manual removal of the placenta is impossible and hysterectomy must be performed.

(To be concluded in April number)

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## Selected Abstracts

### Gynecologic Operations

Fothergill, W. E.: The Abdominal Incision in Pelvic Surgery. *British Medical Journal*, March 22, 1924, p. 515.

The writer's personal experience of gynecologic surgery dates from the time when all abdominal incisions were made in the middle line and were closed with through-and-through silkwormgut sutures. Incisional hernia must have been fairly common in those days, as it was usual for every patient whose abdomen had been opened to wear a belt for the rest of her life. Later it began to be the custom to suture in layers, first with silk, and later with catgut. Gradually the use of the belt was found to be unnecessary, and was dropped except in special cases.

Many of the women treated in a gynecologic ward have, before operation, very defective and inefficient abdominal walls. It seems a pity, if the abdomen has to be opened for some other purpose, to close it again without taking steps to secure for the patient a better abdominal wall than she possessed before her operation. A long time ago, therefore, the author made it his rule to open the sheaths of the rectus muscles on both sides throughout the whole length of the incision. When this has been done the inner edges of the recti come together and lie in direct contact as the wound is closed, and this without any injury to their nerves or to their blood supply. The union secured is muscle to muscle, and the so-called linea alba is done away with.

He considers the incision in the midline below the umbilicus the best for gynecologic work, and it might be used with advantage by general surgeons when the diagnosis is not clear—as, for example, in cases of appendicitis and diverticulitis complicated by the results of infection of the pelvic organs—for the median incision cannot injure the muscle or the fascia as the lateral incision may do. It gives better access to both sides of the lower abdomen, and it can be extended upward as may be desired. Further, it gives the opportunity for improving the patient's abdominal wall in all women whose recti lie far apart.

FRED L. ADAIR.

Southam, A. H.: A Comparative Study of Abdominal Incisions. *British Medical Journal*, March 22, 1924, p. 513.

The making of an abdominal incision is one of the most important steps in an abdominal operation. Certain incisions appear more liable than others to be followed by ill effects. An abdominal incision when properly made should afford free access to the affected organ and should at the same time inflict the least possible amount of injury on the structures of the abdominal wall.

On the tonus of the abdominal musculature depends the maintenance of the positive intraabdominal tension which is of such great importance in retaining the organs in their normal relationship.

Incisions through the midline have been and still are largely used for pelvic

operations. A low median incision is the commonest site of ventral hernia not preceded by infection. The general direction of the aponeurotic fibers in this situation is transverse, and every increase in intraabdominal pressure and every strong contraction of the lateral muscles tends to draw the edges of the incision apart, leading to a liability to ventral hernia.

The transverse incision across the lower part of the abdomen is also employed in gynecologic work. The advantages of this incision are the strength of the resulting scar and that no nerves or muscles are damaged. Its main disadvantages are the length of time required both to make and close the incision, and that without division of the muscles and ligature of the deep epigastric arteries it gives only limited space.

The suturing in layers was a vast improvement, but left a linear scar continuous throughout all the layers of the abdominal wall. This can be obviated by dividing the tissues in different vertical planes so that the scars are covered by a sound layer above and so insure increased strength.

FRED L. ADAIR.

**Schumacher: Iodizing the Skin in Laparotomy.** *Muenchener Medizinische Wochenschrift*, 1921, lxxviii, 366.

The author refutes the conclusion arrived at by Propping in which the latter advocates the nonemployment of tincture of iodine on the skin in abdominal operations because of the damage done to the serosa of intestines coming in contact with the iodine. Schumacher reports that out of 2300 laparotomies only two had to be reoperated for ileus and the pathology found could readily be explained by the condition which necessitated the first operation. In many other cases in which the abdomen was opened a second time (not for obstruction) no very marked adhesions were encountered. As tincture of iodine was routinely employed in the skin preparation in all these operations the author concludes that its use is not contraindicated in abdominal section, at least where the Trendelenburg position and isolation of the intestines with wet packs are employed.

S. S. SOLLAUG.

**Beuttner: The Technic of Peritonization in the Female Pelvis.** *Zeitschrift für Geburtshülfe und Gynäkologie*, 1923, lxxxvi, 1.

The author emphasizes the importance of studying the methods employed by Nature in walling off pelvic inflammatory foci as a rational basis for procedure in postoperative peritonization. Use is generally made by Nature of the omentum and frequently of the bladder and sigmoid to wall off the pelvis from the intestines, and prevent an ascending infection of the peritoneal cavity. A careful review of the conditions found at operation, a limitation of the loss of serosa to the least amount that the operation will allow, and a careful estimate of the amount and location of serosal loss is of the greatest importance in satisfactory peritonization. The author divides the pelvic peritoneum into zones to facilitate this estimate. Ventrofixation, not as a correction for a misplacement but rather to stabilize the uterus against unequal pull from the scar tissue in one or the other broad ligaments, is often a valuable aid. Attachment of a serosal fold from the bladder or the anterior parietal peritoneum to the posterior upper wall of the uterus after a transverse excision of a fundal wedge may exert a similar stabilizing effect in addition to the peritonization.

Various other typical peritonizations are described and a number of cases presenting particular and unusual problems, but allowing use of the same general principles, are described and illustrated.

MARGARET SCHULZE.

**Culbertson:** Use of the Sigmoid Flexure and Cecum in Pelvic Peritonization. Journal American Medical Association, 1921, lxxvii, 772.

Believing that adhesions to the ileum cause most distress, Culbertson prevents its descent into the pelvis by walling it off completely from above. This he accomplishes by sewing the round ligaments together in the midline and attaching to their edge the sigmoid flexure and, if necessary, the cecum as well. The gut is attached by sewing through the appendices epiploicae.

Culbertson bases his procedure on the fact that the sigmoid spontaneously walls off the pelvis in cases of inflammatory conditions about the adnexa. He has never seen any ill results from fixing this gut. The method is applicable in any case where operative work leaves the pelvis in a denuded condition, but especially after operations for extensive inflammatory disease of the adnexa.

R. E. WOBUS.

**Jayle, F.:** The "Esplanade," or Pelvic Reflex. La Presse Médicale, Paris, Aug. 22, 1923, p. 725.

The author has noted this reflex for many years, and states that it was so named by Richelot on account of its resemblance to a cry peculiar to some Japanese showmen on the Esplanade of the Paris Exposition of 1899. This characteristic, raucous cry is occasionally elicited in vaginal or abdominal hysterectomy in spite of the anesthesia, and has even been noted in healthy female subjects during coitus. The occasional case of vomiting of early pregnancy associated with retroposition, which is relieved by the correction of the displacement and the use of a pessary, is no doubt due to the same mechanism.

The phenomenon is probably dependent upon irritation of the hypogastric plexus, which is in relation with the anterior wall of the rectum and with the sacrouterine ligaments; some of its fibers penetrate the uterine muscle. The reflex is produced by the interrelationship between this ganglion and others of the sympathetic system. It is very rarely elicited in the male; according to some writers, only when, in anal dilatation, the manipulation is carried as high as the prostate.

E. L. KING.

**Fothergill, W. E.:** A Lecture to Graduates on Three Years of Pelvic Surgery. British Medical Journal, 1922, No. 3204, p. 830.

The author considers pelvic infection and analyzes his method of treatment; also pelvic growths of which the fibroids were the most common. He had six deaths in 200 cases. He had 25 cases of cancer of the cervix, 12 inoperable, 13 treated by total abdominal hysterectomy with no deaths. There were 23 cases of cancer of the corpus all treated by abdominal hysterectomy with three deaths. There were 14 cases of ovarian carcinoma. Five of the 14 died from exhaustion. Of 114 cases with cystic and solid growths of the ovary and broad ligament, there were four deaths. Fifty-nine cases of retroversion were treated surgically by Webster's procedure. He considers this the most satisfactory operation for retroversion. There were other miscellaneous operations, making a total of 515 abdominal sections with 18 deaths, or 3.3 per cent. This mortality could have been reduced by a more careful selection of the cases. Only three of the 18 were in ordinary good health when they sought treatment. The three in good health died from shock, embolism and pneumonia, and the pathologic factors which contributed to the death of the other 15 were already present at the time of operation. Of the vaginal operations, 406 were operated for genital prolapse with permanent cure of 97 per cent. Other miscellaneous vaginal operations bring the total up to 809 cases.

T. L. ABARE.

**Hartmann, Henri:** The Amputation of the Cervix Uteri. *Gynécologie et Obstétrique*, 1922, v, 142.

The author describes an operation devised by himself for the amputation of the cervix. He thinks the autoplasmic amputation of the cervix is a good operation when properly performed. He believes it is not often necessary to have recourse to this operation but that it is the best treatment for large sclerotic and cystic cervixes.

F. L. ADAIR.

**Schmidt:** The Late Results of Conservative and Radical Operations in Chronic Adnexal Inflammations. *Zeitschrift für Geburtshilfe und Gynäkologie*, 1924, lxxxvii, 428.

The author draws conclusions from a series of 162 cases of inflammatory disease operated in the Bonn Clinic. There were 120 conservative operations: 31 unilateral salpingo-oophorectomies, 39 bilateral salpingo-oophorectomies, 41 bilateral salpingectomies with unilateral oophorectomy, and 9 unilateral salpingo-oophorectomies with a salpingostomy on the closed tube of the opposite side. Two of these cases died, a mortality of 1.8 per cent. There were 42 radical operations: 25 total extirpations, 9 supravaginal amputations of the uterus with bilateral salpingo-oophorectomy and 8 panhysterectomies with bilateral salpingectomy but unilateral oophorectomy. Two of these cases died, a mortality of 4.8 per cent. Seventy-two of these cases were reexamined, 45 after conservative and 27 after radical operations. In addition, written answers were obtained from 29 women, 21 of the conservative and eight of the radical operations.

From a careful study of the material the author concludes that operation should be entirely avoided as long as there is any fever. Elevation of temperature indicates renewed inflammatory processes and virulent bacteria. Three operations undertaken in the presence of low-grade fever resulted fatally from peritonitis.

The radical operation yields about 30 per cent more of satisfactory results than the conservative. There were no bad results in any of the radical operations, but these occurred in 21.5 per cent of the conservative. Radical operation is, therefore, the only procedure which will certainly free the patient of symptoms and restore her capacity for work. None of the conservative procedures will guarantee this. Disadvantages of the radical operation are: first, the greater seriousness of the intervention; second, the mutilation; and third, the final destruction of all possibility of conception. These considerations, and particularly the two latter, will even yet frequently decide in favor of the conservative operation, especially in young women desirous of bearing children, in spite of the fact that unilateral salpingo-oophorectomy gives the least chances of permanent cure and capacity for work and that plastic operations upon the tube are only rarely successful.

MARGARET SCHULZE.

**Duroux, E.:** Preliminary Vaginal Amputation of the Uterine Cervix in Total Abdominal Hysterectomy. *La Presse Médicale*, Paris, March 22, 1924, p. 258.

The author claims that by employing this procedure an abdominal hysterectomy is greatly facilitated, and that the operation is not prolonged, the two interventions consuming no more time than a complete abdominal hysterectomy by one of the established methods. Furthermore, he claims that "the dangerous maneuvers of liberation of the cervix" are simplified, and that in cancer of the cervix, the dangers of insemination and of infection are minimized.

The technic is as follows: the cervix is pulled down, and the vagina is incised circularly at its cervical attachment (this being done with a scalpel directed

toward the uterine tissue). The collar thus formed is seized with forceps, the cervix is amputated, and the oozing checked by tamponing; if there is free bleeding, a clamp is applied to the bleeding point. The abdomen is now opened, and the hysterectomy performed. An assistant removes the vaginal clamps and the tampon from below. The vagina is now closed (after resection, in case of cancerous infiltration). Drainage may be employed, if deemed advisable.

E. L. KING.

**Dartigues, M.: Total Abdominal Hysterectomy with Direct Peritoneal Drainage.** *La Presse Médicale*, 1921, No. 87, p. 861.

The author describes the technic of his operation for hysterectomy with the insertion of a drainage tube through the abdominal wall and the vagina.

F. L. ADAIR.

**Kelly: Drainage in Pelvic Abdominal Surgery.** *New York Medical Journal*, 1921, cxiv, 390.

The author reviews the history of drainage in abdominal surgery. He feels that, although present-day methods have to a large extent limited the indications for drainage, it is still occasionally desirable. He would drain every case where infectious material had been spread or there had been soiling by bowel contents; in all cases where pelvic adhesions had been so extensive and firm about the floor and walls that the occurrence of considerable serosanguineous weeping seemed a certainty; always after removing a cancerous uterus, and he advises a small special drain in most cases of myomectomy where sometimes weeping and bleeding occur unaccountably. Although some would reverse this dogma, he says, when in serious doubt, drain.

MARGARET SCHULZE.

**Dietrich, A.: Adenoma Formation in Abdominal Scars.** *Archiv fuer Gynaekologie*, 1923, cxx, 306.

The author describes a case of adenoma formation in an abdominal scar following ventral fixation of the uterus. Only six other cases have been reported (R. Meyer, v. Franqué, Klages, Fraas, Lauche, Bergman). The author agrees with R. Meyer that these structures originate from serosa, and shows photomicrograms which demonstrate the development of the adenoma tissue from the serosa endothelium.

RALPH A. REIS.

**Frankenstein, K.: The Prophylactic Pouring of Ether into the Abdominal Cavity During Laparotomies to Induce Post-operative Intestinal Peristalsis.** *Monatsschrift fuer Geburtshilfe und Gynaekologie*, 1923, lxii, 180.

Since 1919 the author has poured ether into the peritoneal cavity in every patient on whom he performed a laparotomy. He uses ether not only in the infected cases but also in the clean cases because of the extraordinary stimulation of intestinal peristalsis which it produces. Most of the patients pass gas the day after operation without any pain. From 30 to 50 c.c. of ether are used in each case and poured into the abdominal cavity before beginning to sew the peritoneum.

It was found that the ether which is poured into the abdominal cavity passes into the general circulation and the patients remain asleep for a long time after the operation. The only ill effect noted in these patients was a frequent temporary tachycardia during the first 24 hours after operation, but this disappeared spontaneously in every case.

A further advantage of this procedure is the prevention of adhesions. Of the 423 patients so treated, 69 per cent were seen again after operation. In only one case could clinical evidence be elicited of postoperative adhesions and this despite the fact that in 15 per cent of the cases, pus had been found at operation.

J. P. GREENHILL.

Mayer: Postoperative Paralytic Ileus. *Münchener medizinische Wochenschrift*, 1924, lxxi, 931.

The author recommends a treatment which he feels has given him the best results with the condition. He introduced from 500 c.c. to 1000 c.c. of saline with 4 c.c. or 8 c.c. pituitary extract intravenously, or if this is impossible, the drip method is employed. In 70 per cent of his 52 patients the bowels soon moved and so the existence of a mechanical ileus was improbable. However, in spite of the fact that he was able to get the bowels of so many of these patients to move, the majority of them died, but he considers 10 per cent recoveries as very good. He does not attempt to decide whether the ileus is mechanical or due to sepsis. If after the treatment here recommended no results are obtained, enterostomy is the next thing to be considered and should be employed as a last resort.

A. C. WILLIAMSON.

Giles: Some Gynecological Operations in Relation to the Life Assurance. *The Lancet*, 1923, cciv, 884.

This address is based on the author's original study of 1,000 cases plus the study of 3,000 additional cases.

In general, two questions may be asked: first, what is the expectation of life after abdominal operation, and second, what is the state of health after abdominal operation. In formulating an answer to the first question, the exact conditions present at the time of the operation must be available. With reference to this, it is most important to know whether or not malignant disease is present. The writer considers the life expectation after operation for carcinoma and for benign tumors, inflammatory conditions and other procedure.

In reply to the second question, the author found that 72.5 per cent of patients operated upon expressed themselves as being in very good health. It is extremely interesting to know that the highest percentage of cases of very good health occurred in patients where the appendages on both sides were removed. The lowest percentage was in cases where the appendages were removed only on one side. Hysterectomies for benign conditions, ventrofixations, myomectomies, also showed a very high percentage of very good health following the operation.

Where a unilateral salpingoophorectomy was done, pathology sufficient to require further operation on the other tube and ovary occurred in 10.9 per cent of the cases. It was further found that the memory was somewhat affected by operation. The degree of this involvement was determined largely by the duration of the operation. About 70 per cent of the patients regained normal health. The highest proportion of the cases was found where conservative procedure and complete removal of the organs had taken place. Unilateral operations of the uterine appendages show the lowest proportion of complete recoveries, the chances of complete cure being subordinate to the preservation of the functions of womanhood. There may be a disturbance of the nervous system, as shown by the affection of the memory. In most cases this is temporary, in a proportion varying from 18 per cent where the operation was of short duration, to 50 per cent where the operation was of long duration. There is a risk that further operation may be required in about ten per cent of cases. This includes the direct sequelae of



the operation and independent conditions in about equal proportions. The risk is greater after operations for inflammatory disease of the tubes, and after unilateral operations of the tubes and ovaries.

Cases where operations for malignant disease have taken place must be regarded as bad life risks. After operations for inflammatory disease the expectation of life is fairly good, but is impaired by the liability of sequelae. Patients who have had benign tumors removed may be considered as good life risks, as the chance of complications which may lead to a fatal result, is negligible.

NORMAN F. MILLER.

**White, C.: Instruments Left in the Peritoneal Cavity.** *The Clinical Journal*, London, 1923, lii, 553.

The case reported is that of a woman of fifty referred because her doctor found a sharp pointed body in the cervix. She had consulted the physician because of acute pelvic pain. Nineteen years previously an abdominal operation had been performed for an abdominal tumor. Eighteen months before the author saw her a second operation had been performed to relieve symptoms but the patient was told that the adhesions were too dense to allow anything extensive to be done. The author removed a hemostat whose points had eroded the uterus above the bladder reflexion and the handles had eroded the pelvic colon and were in the cavity of the gut. She died some six weeks later from an attack seemingly of anaphylactic origin.

In a second case the writer removed a bone penholder from the peritoneal cavity which had been introduced through the vagina and remained in the cavity about ninety hours. Recovery was uneventful.

A canvass of the surgeons of Great Britain showed that there were forty-four cases of this type who had been operated with eleven deaths. Among the thirty-three patients who recovered, the foreign body had remained in the peritoneal cavity up to 7, 12, 15 and 19 years. Twenty-six were treated by second operation, and in the remaining seven the instrument was passed through a sinus or per rectum. The operation was performed within a few hours in 5 cases; within forty-eight hours in 4 cases; within a few weeks in 8 cases; and in the remaining 9 during periods ranging from six months to many years. The author urges large packing rolls instead of sponges, and the number of instruments to be kept at a minimum with an easy system of checking and accounting for them all.

A. C. WILLIAMSON.

**Chifoliau: The Operative Risk in Surgical Treatment of Uterine Fibroids,** *Le Progrès Médical*, 1924, No. 42, p. 622.

The conclusions of this paper are based on the results of all operations for fibroid tumor of the uterus performed by the author during the last twenty years. The cases are divided into two groups, those from 1904 to 1914, and those from 1919 to 1924. In the first group there were 145 cases with a mortality of 13.7 per cent while in the second there was a mortality of less than 1 per cent in 191 cases operated.

Of the twenty deaths occurring during the first period, 12 were due to infection, 5 to embolism, 1 to hemorrhage, and 1 to chloroform anesthesia. The hemorrhage occurred following the removal of hemostats on the third day after a vaginal hysterectomy. In this connection Chifoliau points out the necessity for great precaution, believing that it should be done in the operating room and with good vaginal exposure so that the pedicles may be reclamped if necessary.

Massive pulmonary embolus occurred on the second, ninth, fourteenth, and twenty-second day. There were no prodromal symptoms. The author does not believe that embolus is a complication of operation for fibroid any more often than for any other intraperitoneal operation. He also points out the possibility of some associated infection being an etiologic factor in these cases, and therefore states that operation should not be carried out unless such infection is completely healed.

The majority of the thirteen instances of infection were rapidly developing cases of peritonitis which occurred on the fifth or sixth day. The remainder occurred somewhat later, starting as either an abdominal wall infection or a pelvic abscess and resulting in distant foci of infection. This complication occurred only where the fibroid was associated with some infective process of the pelvic organs.

In the second series the one death which occurred took place on the ninth day and was due to uremia. Here again Chifoliau brings out the advisability of careful study of the urinary tract as he has found that the blood urea is often elevated in women suffering from uterine fibroids.

The necessity for careful examination of the patient and the choice of proper anesthetic is emphasized. In young individuals with no complications ether is preferable. In older and more adipose patient chloroform is used. In cases where there is evidence of kidney damage, nitrous oxide is the anesthetic of choice. Spinal anesthesia is not advocated because of the possibility of cerebral complication.

THEODORE W. ADAMS.

**Lecene and D'Allaines: The End Results of Partial Hysterectomy, Journal de Chirurgie, June, 1924, xxiii, 628.**

In June, 1922, these authors had published their technic for supraisthmic hysterectomy with conservation of one or both ovaries and removal of the tubes. They claimed that the advantage of this operation lies in the preservation of the menstrual function if two to three centimeters of the uterine mucosa is left.

After following carefully 74 cases in which this type of operation was done they come to the following conclusions: (1) Fundal hysterectomy in women under 40 years of age insures preservation of menses without serious menopausal symptoms. (2) The operation is indicated in all cases where it is possible to conserve one ovary or part of an ovary with good blood supply. (3) Fundal fibroids, multiple or nonenucleable; chronic bilateral inflammations; or tubal pregnancies are indications for this procedure. (4) Where there is danger of active peritoneal infection it is not felt that this operation is not indicated.

THEODORE W. ADAMS.

**Maxwell, Alice Freeland: Fate and Function of the Ovaries after Hysterectomies. Journal of American Medical Association, 1924, lxxxiii, 663.**

The menopausal symptoms of 500 hysterectomies with and without removal of the ovaries were studied and compared with the symptoms in natural menopause. After surgical removal of both ovaries all vasomotoric symptoms were found to be increased. In instances where the ovaries or parts of them could be retained, the frequency of the symptoms equals that of normal menopause. Normal and surgical menopause have an average duration of two and one half years. The importance of retaining a healthy, well vascularized part of an ovary is emphasized. The writer believes that women with low hemoglobin values are more likely to develop postoperative disturbances.

GROVER LIESE.

## Book Reviews

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THE MEDICAL SCIENCES IN THE GERMAN UNIVERSITIES. A study in the history of civilization. Translated from the German of Theodor Billroth, with an introduction by William H. Welch. New York, Macmillan Company, 1924.

THE DISTRIBUTION OF PHYSICIANS IN THE UNITED STATES. By Lewis Mayers and Leonard V. Harrison. General Education Board. New York, 1924.

BASAL METABOLISM IN HEALTH AND DISEASE. By Eugene F. DuBois, M.D., Medical Director, Russell Sage Institute of Pathology, etc. Lea & Febiger, Philadelphia and New York, 1924.

REPORT OF THE SCIENTIFIC RESEARCHES ON THE VENEREAL DISEASES. Published by the American Social Hygiene Association. New York, 1924.

WERDEN UND WIRKEN EINES DEUTSCHEN FRAUENARZTES. Lebenserinnerungen von A. Martin. Verlag von S. Karger, Berlin, 1924.

DIE HELIOTHERAPIE DER TUBERKULOSE. Von A. Roller. Zweite vermehrte und verbesserte Auflage. Mit 273 Abbildungen. Verlag von Julius Springer, Berlin, 1924.

MANUAL OF OBSTETRICS. By John Cooke Hirst, Associate Professor of Gynecology and Obstetrics, Graduate School of Medicine, University of Pennsylvania, etc., etc. W. B. Saunders Co., Philadelphia, 1924.

CANCER DE L'UTERUS. Par Jean-Louis Faure, professeur de clinique gynécologique à la faculté de médecine de Paris. Avec 113 figures dans le texte et 4 planches en chromotypographie hors texte. Librairie Octave Doin, Paris, 1925.

GYNECOLOGY, MEDICAL AND SURGICAL. By P. Brooke Bland, Assistant Professor of Gynecology, Jefferson Medical College, etc., etc. With 644 illustrations, mostly original, including 43 colored text figures, and 12 insert plates, 10 of which are in colors. F. A. Davis Company, publishers. Philadelphia, 1924.

LEHRBUCH DER GYNAEKOLOGIE. Von Professor Dr. W. Stoeckel, Universität Leipzig, und Professor Dr. K. Reifferscheid, Universität Göttingen. Voellig neubearbeitete 13. Auflage des Lehrbuches von H. Fritsch. Mit 443 Abbildungen im Text und auf 50 farbigen Tafeln. Verlag von S. Hirzel, Leipzig, 1924.

CANCER. HOW IT IS CAUSED; HOW IT IS PREVENTED. By J. Ellis Barker. With an introduction by Sir W. Arbuthnot Lane. New York, E. P. Dutton & Co. 1924.

DISEASES OF THE RECTUM AND PELVIC COLON. By Martin L. Bodkin, New York. Rectal Surgeon, St. Catherine's Hospital, etc., etc. Illustrated. Second edition, revised and enlarged. New York. E. B. Treat & Co. 1925.

## Items

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### Historical Collection, Woman's Hospital, New York, N. Y.

Dr. George Gray Ward, Chief Surgeon of the Woman's Hospital, would be very grateful for contributions of apparatus, instruments, books and other material dealing with the development of American gynecology.

These are desired for the historical collection, for the display of which excellent arrangements have been made at the Hospital and will serve as a permanent depository for such material. Communications should be addressed to Dr. Ward, Woman's Hospital, West 110th Street, New York City.

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### European Clinic Tour

The Inter-State Post Graduate Assembly Clinic Tour of American physicians to Canada, British Isles and France will leave in May, 1925. The clinics and demonstrations connected with this tour will include all the different branches and specialties of medical science.

The officers of the tour are as follows: President—Dr. Charles H. Mayo, Rochester, Minnesota. Chairman of the Orientation Committee—Dr. Addison C. Page, Des Moines, Iowa.

Director of the Tour—Dr. William B. Peck, Freeport, Illinois. Secretary—Dr. Edwin Henes, Jr., Milwaukee, Wisconsin.

The tour will start from Chicago by special trains on May 17. Physicians living in territory where it will be more convenient to go direct to Toronto will be provided with transportation direct to that city. May 18 and 19, will be spent in the clinics of the University of Toronto.

May 20—Trip through the Thousand Islands and the St. Lawrence Rapids.

May 21-22—The physicians will attend the clinics of the teaching staff of McGill University, Montreal, and on May 23 will sail for Liverpool, arriving in that city May 31.

An intensive professional transatlantic program will take place on board ship contributed to by some of America's most distinguished physicians.

June 1 to 7—The physicians will be entertained in London. The clinic arrangements in London are under the direction of the Honorary Organizer, Mr. Philip Franklin, Honorary Secretary of the Laryngological Section of the Royal Society of Medicine, and Medical Director of the American Hospital, London; Sir John Bland Sutton, President of the Royal College of Surgeons; Sir Humphry Rolleston, Bt., President of the Royal College of Physicians; Sir William Arbuthnot Lane, Bt.; Sir St. Clair Thomson, President of the Royal Society of Medicine; Sir William Hale White, Retiring President of the Royal Society of Medicine; Mr. H. I. Waring, Vice-Chancellor of the University of London and Mr. W. Girling Ball.

June 8, 9, 10—The physicians will visit the clinics of Liverpool, Manchester and Leeds, alternating among these cities. At Liverpool, the clinic arrangements are under the direction of Sir Robert Jones, R. E. Kelly, F.R.C.S. and colleagues.

At Manchester the clinic arrangements are under the direction of Sir William Milligan and associates. At Leeds, they are under the supervision of Sir Berkeley Moynihan and associates.

June 11, 12—The physicians will visit the clinics of Dublin, where arrangements are under the general management of Sir William DeCourey Wheeler, Sir William Taylor, Sir Arthur Ball, Sir Robert Woods and their colleagues.

June 13, 14, 15—The physicians will be the guests of the members of the teaching staff of Queen's University of Belfast. The following committee of arrangements has been appointed and accepted to arrange clinics and demonstrations: Prof. Andrew Fullerton, Mr. Thomas Sinclair, Prof. W. W. D. Thomas, Prof. R. J. Johnstone, Prof. C. G. Lowry, Prof. J. E. MacIllwaine, Dr. A. J. Craig, Dr. H. Hanna, Prof. Symmers, Dr. Thomas Houston and Dr. S. Boyd Campbell.

In presenting the clinics and demonstrations the teaching staff of Queen's University will be associated with that of the Royal Victoria Hospital.

June 16, 17—The physicians will be in Glasgow, where the clinics are now being arranged by Mr. Farquhar Macrae, Mr. J. H. Pringle, Dr. Findlay Cowan and Dr. John Patrick and their colleagues. On these dates excursions will be run to Ayr for families of the doctors and their friends.

June 18, 19—The physicians will be guests of the Royal Infirmary of Edinburgh. Clinics are being arranged by Sir Harold Stiles, Sir Norman Walker, Sir Robert Philip and associates on the staff of the Royal Infirmary.

June 20—The physicians will visit the clinics of Newcastle and the University of Durham. Mr. George Grey Turner, F.R.C.S., Sir Rutherford Morrison and other members of the staffs of the hospitals and clinics of this city have charge of the clinic arrangements.

June 22 to 27—The time will be spent in Paris. The clinic arrangements and social functions here are under the supervision of Professors Tuffier, de Martel, Gosset and Delbert in surgery, Drs. Sebilean de Fourmentel and Lermoye in otorhinolaryngologie, Drs. Vidal, Chauffard, Sergeant, Levaditi and Martin in medicine and Prof. Morax and Delapersonne in ophthalmologie.

Social features include: A reception given by the Academy of Medicine; a large reception given in honor of the American physicians by the Municipal Council of Paris at the Hotel de Ville (City Hall); an evening reception by the Inter-Allied Assembly and a reception by Prof. Tuffier at his country home, which is located near Versailles.

June 28—First sailing for home. July 4—Second sailing, permitting physicians to attend the clinics of Lyon and Strasbourg.

This tour is open to members of the professions who are in good standing in their state or provincial societies and their families. No restriction of territory. This invitation is understood to be extended to Canadian physicians as well as those of the United States. The association will also be able to take care of a limited number of lay friends of the physicians. The lay friends will be afforded every advantage offered the physicians, excepting attendance upon the clinics.

For further information, write Dr. William B. Peek, Freeport, Illinois.





THOMAS J. WATKINS, M.D.  
Died April 1, 1925

# The American Journal of Obstetrics and Gynecology

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THOMAS J. WATKINS, M.D.

1863-1925

On April 1, there was suddenly taken away from a life of activity and usefulness, Dr. Thomas J. Watkins, of Chicago, a member of the Advisory Editorial Board of this journal since its inception and continuously interested in its progress and development.

From humble beginnings, after spending early years of toil and drudgery on a farm near Utica, N. Y., where he was born in 1863, Dr. Watkins worked his way through the preparatory schools to fit himself for a professional education. This was completed at Bellevue Medical College, where he obtained his M.D. degree in 1886. Internships in various institutions followed, including the Woman's Hospital of New York, where he came under the direct tutelage of the late Dr. Thomas Addis Emmet, an association which undoubtedly favored and developed his interest in plastic surgery of the female genital tract. Dr. Watkins subsequently moved to Chicago where he joined the staff of the Northwestern University Medical School and continued in active association with it until the time of his death, when he was Chief of the Department of Gynecology. He was also Attending Gynecologist at St. Luke's Hospital. Dr. Watkins became a Fellow of the American Gynecological Society in 1896 and was actively associated with its work, serving as president in 1915. In addition to membership in the Advisory Editorial Board of the AMERICAN JOURNAL OF OBSTETRICS AND GYNECOLOGY he functioned in a similar capacity with *Surgery, Gynecology and Obstetrics*. He was likewise active in many other medical societies and closely associated with the development of the American College of Surgeons.

Dr. Watkins was one of the most active and farseeing workers in our specialty. He was an excellent teacher and impressed those with whom he came into personal contact, by his friendliness, gentleness and unself-



fishness. He was always ready to help others and by his beautiful character endeared himself to a host of friends and associates. Well known as a diagnostician and most skillful in the art of plastic gynecologic surgery, his claim to recognition in American gynecology is centered in the development of the procedure which has been named after him,—the Watkins transposition operation on the uterus. He first described this in 1899, and with Dührssen and Schauta, should receive full credit for perfecting a method which is widely accepted as a reliable means for treating vesicouterine prolapse and for the performance of which he established definite and well-marked indications.

To the memory of Dr. Watkins as a physician of signal ability, modest and unassuming, yet ever friendly, courteous and generous, with high ideals and noble aspirations, to the memory of such a man the editors of the journal are happy to extend these words of praise and remembrance.

G. W. K.



## Original Communications

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### GANGRENE OF THE EXTREMITIES FOLLOWING GYNECOLOGIC OPERATIONS AND THE PUERPERIUM—WITH REMARKS ON EMBOLECTOMY\*

BY ARTHUR STEIN, M.D., F.A.C.S., NEW YORK CITY

(Visiting Gynecologist, Harlem Hospital; Visiting Gynecologist, Hospital of Joint Diseases; Associate Visiting Gynecologist, Lenox Hill Hospital, New York.)

PERIPHERAL gangrene of embolic origin, due to obstruction of the principal arteries of the affected limb, has been observed to follow the normal puerperium, spontaneous or induced abortions, and gynecologic operations, not to mention operations in the field of general surgery. In many instances the peripheral embolism is not a separate disease but merely a link in an entire chain of emboli in other localities. A compilation of the scattered cases in the literature and two personal observations of this complication were published by me in *Surgery, Gynecology and Obstetrics* in 1916 (xxiii, p. 424) but the time has come to bring the entire subject, from pathogenesis to therapy, again to the attention of the surgeon, as a faint hope is now offered in this desperate complication by the early performance of arteriotomy followed by embolectomy. This helpful intervention which has been rendered possible through the modern technic of vascular surgery will be discussed in detail further on.

The extremely variable cause of the obstruction in the arterial and venous system is best illustrated by the following tabulation adapted from Wormser and brought up to date from my previous publication on this subject:

#### OBLITERATION IN THE ARTERIAL SYSTEM

"1. Embolism. In septic endocarditis with deposits on the heart valves. Thrombosis of the left heart, chiefly the auricula, the result of septic endocarditis; paradox embolism in case of a patent foramen ovale, naturally rare in a woman who has reached the childbearing age.

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\*Read at the Thirty-seventh Annual Meeting of the American Association of Gynecologists, Obstetricians and Abdominal Surgeons, held in Cleveland, September, 1924.

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NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

"2. Arteritis. Primary (septic and toxic endarteritis); secondary (through propagation of inflammation by contiguity from the adjacent veins).

"3. Thrombosis. Primary (ascending from the uterine artery or its terminal branches at the site of the placenta or after gynecologic operations). In these cases thrombi form in the uterine artery and from there extend through the internal iliac artery into the common iliac artery. Here they are broken off and form emboli in the femoral artery.

#### OBLITERATION IN THE VENOUS SYSTEM

"1. Phlebitis. Primary (septic and toxic thrombo-phlebitis); secondary (a) through propagation, in metro-phlebitis, (b) through extension of the inflammation by contiguity from the adjacent artery.

"2. Thrombosis. Primary (beginning in infected veins), secondary (interruption of the circulation in the concomitant artery)."

In discussing the symptoms I quote further from my previous article on this subject. "*Symptoms:* The phenomena of incipient gangrene are identical with those of mechanical obstruction of the blood vessels and naturally vary according to the mode of origin. Pain is very pronounced and never absent in extensive vascular obliterations such as lead to peripheral gangrene. In milder cases only a rise in temperature will indicate some slight infection. The mode of onset of the gangrenous symptoms will sometimes, though rarely, suggest the cause and seat of the vascular obstruction. A sudden onset usually points to embolism in the arterial system (dry gangrene) while on the other hand the gangrene may develop very insidiously in the case of a small embolus. The onset of gangrene may be abrupt or gradual also in cases of purely venous obstruction (moist gangrene) so that the rapidity of evolution of the symptoms permits only an uncertain conclusion as to the seat and origin of the obstacle.

"In a general practical way it may be said that the early appearance of gangrene in the first few days of the puerperium or after gynecologic operations points to an arterial (the most common) origin."

*Prognosis.*—The prognosis in pronounced cases is governed by the timely performance of embolectomy, or as a last resort amputation. While the mortality is still deplorably high it has nevertheless been lessened by one-half since the institution of modern methods of treatment. Whenever the diagnosis of embolus of any of the large vessels is made, no time should be lost in the prompt performance of embolectomy. Key has published an illuminating article on this subject and he reports a number of cases where the timely performance of embolectomy has saved the patient's life. The sooner this operation follows the typical signs of complete occlusion of the affected vessel, the better are the patient's chances. The first twenty-four hours after the onset of the symptoms apparently offers the best results.

Where however embolectomy fails of the desired result, it must be decided in each individual case whether the well-known conservative measures will suffice or amputation of the affected limb is rendered imperative.

*Prophylaxis of Embolism.*—In the presence of a preliminary thrombosis, the prevention of embolism consists in the treatment of the throm-

bosis, whose onset is to be regarded up to a certain degree as a favorable symptom, in so far as there is a better possibility of guarding against embolism when this eventual danger is understood and realized. Although it is true that embolisms occur in only a small proportion of earlier thromboses, they are noted in about one-fifth to one-tenth of the cases of severe femoral thrombosis. In the absence of external thrombotic manifestations, the difficulties of prophylaxis are greatly increased. Major gynecologic operations such as myomectomy, total hysterectomy, removal of ovarian tumors, etc. always involve a certain risk of subsequent thrombosis. However, a thorough and forcible examination in order to discover an eventual thrombosis is contraindicated for the reason that the necessary manipulations may cause the detachment of a thrombus with an outcome of embolism and obstruction of the blood supply in the affected extremity. Such investigations should therefore be omitted and instead, helpful prophylactic measures should be instituted such as early moving of limbs, getting up out of bed as promptly as is reasonable after operations on the pelvic organs and the judicious administration of heart tonics before and after the surgical interference.

*The lodging place of an embolus* is governed by its size, while the onset or nonoccurrence of gangrene depends upon the development of a collateral circulation. As the strength of the heart is usually much diminished in these patients, the blood pressure in the peripheral arteries is apt to become greatly lowered, resulting in the formation of so-called stagnation thrombosis. This secondary thrombus, forming in a few hours, blocks the collaterals and unless surgical help comes in time to restore its blood supply the limb is doomed.

In cases of fully developed gangrene, the seat of the causative embolus must be looked for considerably above the line of demarcation. In gangrene of the foot and the lower third of the leg, it is situated in the popliteal artery. In gangrene up to the upper third of the leg, it is situated in the lower part of the femoral artery. In gangrene of the thigh, it is situated in the upper part of the femoral artery or the iliac artery or in the aorta. Obstructions of the aorta, however, do not necessarily lead to gangrene of the lower extremities, as the collateral circulation is more readily established here than lower down, namely by way of the circumflex iliac and lumbar arteries. The seat of the obstructive embolus is usually at the bifurcation of large blood vessels such as the aorta, the common iliac, femoral, popliteal, axillary and the upper portion of the brachial artery. The left side seems to be more susceptible to involvement than the right, due to anatomic peculiarities.

Since my publication on this subject in 1916 there have been some additional cases, reported in the literature, bringing the total number of cases of gangrene of the extremities within the domain of obstetrics and

gynecology on record in the international literature up to eighty-six. The following table presents the figures at a glance:

	Up to 1916	Published since 1916
Puerperal Gangrene (lower extremities)	53	4
Gangrene after Abortion (lower extremities)	3	1
Puerperal Gangrene (upper extremities)	10	1
Gangrene after Abortion (upper extremities)	1	0
Gangrene during Pregnancy	4	0
Gangrene after Gynecologic Operations	5	4 (one of upper extremity)
	<hr/> 76	<hr/> 10

I will now take up briefly the several cases which have been published since 1916. As stated above, four cases of puerperal gangrene of the lower extremities are on record. Two cases which belong to this class have been published by H. Rice.

The first patient, a colored iii-para of thirty-eight years, complained on the eighth day after spontaneous delivery of "sticking pains like pins and needles" in the soles of both feet. On the ninth day the left foot presented small hard tender veins over the dorsum and on the tenth day there was marked cyanosis and coolness of the left foot from the ankle down, edema of the dorsum and a hyperesthetic area one and one-half inches wide from a beginning line of demarcation in the metatarsal region and downward. On the eleventh day the area on the left foot had spread above the ankle and the edema extended to the knee with redness and tenderness as far as the middle of the calf. Evidences of incipient gangrene were also noted in the right foot and leg but the dorsalis pedis artery was still plainly palpable. No pulsation could be felt in the left foot which was black and cold. Under progressive aggravation of the general and local condition the patient died on the twelfth day after delivery. (A diagnosis of scarlet fever had been made on the fifth day after her admission to the hospital on the basis of rash and the presence of tongue and throat conditions.)

Rice's second patient, a iv-para of thirty years, on the ninth day after spontaneous delivery complained of gradually progressive "drawing pains" aggravated by motion, in the lower left shin and outer side of the left ankle. A slightly reddened area two inches in diameter was seen on the anterior surface of the right tibia, just above the ankle. The local condition became more marked on the tenth day and the ecchymotic spots appeared over the external and dorsal surface of the foot and ankle. On the thirteenth day a definite line of demarcation appeared on the left ankle laterally and over the dorsum of the foot with coldness, cyanosis and anesthetic zone below it. Treatment consisted in quick guillotine amputation at the junction of the middle and upper thirds of the left calf.

Penkert's patient was admitted to the hospital on account of puerperal fever twenty days after normal delivery conducted by a midwife. A perineal rupture was immediately sutured by a physician and the stitches were removed on the ninth day. Three days later the patient got up for a short time and on lying down again complained of severe pains in the legs and arms. On the twentieth day a piece of retained placenta the size of a plum was removed from the uterus

by hand in the course of a gynecologic examination. The left foot now presented a purplish discoloration beginning about two fingers' width above the ankle. In the course of the following days, moist gangrene of the foot gradually supervened, extending up to about two fingers' width above the malleolar region. Amputation became necessary and was performed just below the middle of the leg (circular amputation in one session). At the same time an abscess was opened in the biceps muscle of the left upper arm from which thick creamy pus escaped. The subsequent history was uneventful and at the time of her discharge from the hospital the patient walked without difficulty with a prosthesis. Two years later she gave birth to a healthy child and got up on the eighth day in good condition. The thrombosis is referred, by the observer, to an embolic infectious endarteritis terminating in peripheral gangrene.

Chesky's patient, a primipara of nineteen years was attacked two days after normal delivery by a high fever and a generalized fine red eruption which disappeared in four or five days. Six days after delivery, symptoms of incipient gangrene supervened in both feet which were swollen, numb and discolored. Four days later when she was first seen by the observer the toes were almost black and beginning to become dry. Swelling extended half way to the knees and there was no definite line of demarcation. Pulsation could not be felt in either dorsalis pedis artery. At the end of a week during which this condition had persisted, the circulation in the feet began to improve but although the cyanosis in the dorsum of the feet subsided, the ends of all the toes became hard and dry, the line of demarcation forming at the distal articulation of each toe. The treatment consisted of removal of the dry gangrenous portion and the patient recovered.

The three cases of peripheral gangrene following abortion are supplemented by Knipe's observation on an illustrative and very instructive case in a septic patient:

This observation concerned a Russian woman thirty years of age with gangrene of the right foot and leg following septic abortion (third month). The condition started as a thrombophlebitis of the right broad ligament and involved the inferior vena cava, both common iliac veins, both external iliac veins and the femoral vein on the right side. There was no arterial involvement. Gangrene, first dry and then moist, spread from the toes and involved the entire foot and lower fourth of leg. A line of demarcation formed in the leg within sixteen days after the onset of pain due to incipient gangrene, about two and one-half weeks after attempting abortion. Death from purulent peritonitis.

Four additions can be made to the group of cases of peripheral gangrene following gynecologic operations: Delacroix reported a case which was operated upon by Cirio and concerned a woman thirty-five years of age who died from gangrene of the lower extremities seventy-three days after an abdominal operation (subtotal abdominal hysterectomy for left sided intraligamentous uterine fibroma with bilateral adnexitis). The patient left the hospital about six weeks after operation but returned at the end of a month in very bad condition with gangrenous lesions of both feet. Examination showed a necrotic patch about 10 by 18 cm. in size on the left foot and a similar gangrenous spot about half that size on the right foot. She died six days after admission but no autopsy was permitted. This case is presumably to be interpreted as gangrene from arterial thrombosis as indicated by its evolution and symmetrical behavior. The latter can be explained only on the basis of ascending thrombosis of the uterine artery which is divided in all hysterectomies thus presenting an entrance avenue for the infection with subsequent clot formation and obstruction of the common iliac artery on one side. From the common iliac the thrombosis continued upward and extended to the aortic bifurcation where it evidently occluded the trunk of the common iliac

artery on the opposite side resulting in the production of a symmetrical gangrene.

E. Key's patient was a woman of forty-three years with organic heart disease of ten years' standing who entered the hospital for the interruption of pregnancy in the fifth month of her ninth pregnancy. An exploratory laparotomy was done three days later on account of obscure abdominal disturbances but the cause of same was not discovered. At the end of eight days the right leg very suddenly became cold and pale, the toes and foot could not be moved. Pulsation was palpable in the common femoral artery but not below it. The diagnosis of embolism was rendered and embolectomy was performed two hours after the onset of symptoms. The common femoral artery was exposed and incised at the upper end of the embolus which was so soft and friable that it had to be removed piecemeal with a spoon. Another embolic mass was removed in the same way from the femoralis propria. The foot and leg became warm and the circulation was reestablished four hours after the onset of symptoms. On the following day however the operation had to be repeated on account of the recurrence of the same condition on the other side with the appearance of a purplish spot on the dorsum of the left foot. The popliteal artery was cleared of thrombi and closed by suture but this embolectomy proved less successful than the first and five days later gangrene of the left foot supervened and the thigh had to be amputated. The patient gradually recovered and was discharged about four months later.

In P. Bull's case the woman, sixty-five years of age, on the fourth day following a minor gynecologic operation suddenly noticed pallor, coldness and anesthesia of the left hand and forearm with difficulty of movement. Flexion and extension were possible but no pronation or supination. The forearm and part of the upper arm were discolored and presented bluish spots. Radial pulsation was absent. On the tenth day after the operation the patient died and at the autopsy the left arm from the elbow to the finger tips was found to be yellowish brown, dry, shrivelled and mummified. The left subclavian artery for a distance of 10 cm. from its beginning was filled with yellowish white thrombi which extended through the brachial artery filling it with softened, grayish white, thrombotic masses.

My own case to be reported here is as follows:—The patient was referred to me by Dr. Galambos of this city on March 13, 1924, and her history was as follows: Although fifty-three years of age she had had no menopause but for a year and a half had had marked hemorrhages which would last three weeks at a time and which were accompanied by pain. She had not lost in weight. The patient's blood pressure was 150 to 160. Her history was otherwise unimportant. She had had three children, no miscarriages. The urine was normal. Bowel movement and urination were also normal.

A general examination revealed the heart and kidneys to be normal. A large tumor was to be felt through the abdominal walls. Vaginal examination showed the uterus to be transformed into a hard irregular mass about the size of a child's head. The parametria seemed free. An operation was recommended and was performed two days later on March 15 as follows (at Lenox Hill Hospital):

"Longitudinal incision. The tumor is found to be a multiple fibroid the size of a man's head and easily movable. A supravaginal amputation is performed with removal of both ovaries and tubes. The cervical stump is then covered with peritoneum. The appendix is found to be retrocecal and reaches up to region of the liver. Its removal is difficult. The stump is cauterized with Paquelin but not inverted. The abdomen is then closed in four layers. Operative procedure—supravaginal hysterectomy, double salpingoophorectomy, appendectomy. The different myomatous tumors are cut open and no signs of malignant degeneration are found. (These findings are corroborated by the microscopic examination.)"

During the next five days the patient presented no alarming symptoms. The highest temperature was on the third day after operation  $100.6^{\circ}$  with pulse of 110 but two days later (March 20) both had dropped to normal.

On March 21, at 2:00 A.M., the patient was suddenly seized with terrific pains in the whole left leg, accompanied by complete pallor, coldness and anesthesia of same. When the patient was seen by me at 8:00 A.M. she was still in extreme pain making the administration of morphine necessary. There was a slight pulsation over the left femoral artery down to about three fingers below Poupart's ligament. The whole leg was cold and presented areas of purplish blue discoloration, rather marked below the knee and in a lesser degree above it and extending up to about four fingers below Poupart's ligament. The left foot was wax-like in appearance. While there was a slight motility of the left leg there was no sensibility. (Needle pricks were not perceived.) A diagnosis of embolus of the left femoral artery was made.

At 3:30 P.M. a consultation with Dr. De Witt Stetten of this city was held. The patient at this time gave the impression of being in good general condition. There was a marked pallor of the foot and a complete loss of power of the lower extremity from the knee down. The skin was mottled around the knee and calf with a definitely parchment-like appearance and feeling on the outer side of the calf. Infiltration (rigor mortis) of the muscles of the calf and lower part of the thigh was present. Complete anesthesia and analgesia from middle of thigh down. Line of demarcation fairly definite through middle of thigh. No femoral pulse palpable. Abdomen soft and sensitive. Vaginal examination showed distinct internal iliac pulse palpable on right side but apparently none on left. No exudate in pelvis. Temperature  $99^{\circ}$ . Pulse 100, and of good quality.

At 5:30 P.M. femoral pulse was distinctly felt although it was more feeble than on the right side. A provisional diagnosis of embolus of the left femoral artery in the upper portion, probably at point of origin of profunda femoris, was made, with impending gangrene of the left lower extremity and at 8:30 P.M. an arteriotomy with embolectomy was performed under nitrous oxide-ether anesthesia as follows:—

Long oblique incision over anterior surface of thigh. Some edema of the perivascular structures was found. No pulsation in artery from upper portion down as far as Hunter's canal. The artery was soft, not rigid, and apparently filled with a soft clot. The vein was not thrombosed. Fair pulsation was to be noted in upper part of common femoral artery just below Poupart's ligament.

Embolectomy (Drs. De Witt Stetten and Stein). Compression of the pulsating portion of the femoral artery with Carrel clamp. Longitudinal incision into artery in lower portion of Scarpa's triangle. Withdrawal from below of a long, soft, red thrombus about two inches in length. Expression by gentle massage from below upward of several smaller clots and irrigation of artery below incision with saline solution until the entire artery from point of incision to Hunter's canal was cleared. Arterial wall noted to be rather soft and intima smooth. Removal of Carrel clamp and probing of portion of artery above incision with withdrawal of several whiter, firmer and more organized thrombi until the upper portion of the artery has been cleared and there is a free spurting of arterial blood. Re-application of Carrel clamp and suture of incision in artery by fine arterial suture of silk soaked in paraffin oil. No ulceration to be noted at point of suture before or after completion of same. Re-opening of suture again clearing a portion of the vessel above the incision until free spurting of arterial blood was again noted. Re-suture with clamp very lightly applied. After completion of suture no pulsation to be noted at suture or below. No bleeding from suture line. Fair pulsa-



tion above point of incision. Further attempt to restore circulation deemed useless. Fascial suture with continuous catgut was made and skin sutured with interrupted silkworm-gut.

On the following day (March 22) the patient's general condition was very satisfactory. The line of demarcation between the vital and devitalized areas seemed to have traveled somewhat further down the thigh. The patient was able to move the thigh muscles thus giving the impression of having some motion in the knee and leg but actually there was no motion from the knee down. Sensation had reappeared a little further down the thigh. The circulation from below the junction of the middle and lower third of the thigh had, if anything, become worse. The mottling of the skin was darker and the parchment-like area on the outer side of the calf had increased in dimensions. (Fig. 1.)

On March 24 the patient's condition was less satisfactory. The discoloration appeared to have advanced upward on the thigh. The entire thigh was much swollen. Evening temperature up to 102°. Pulse between 110 and 120. Abdominal wound had healed by primary union.

On March 25, there was little change in her condition. On the following day temperature was 103°, pulse 120 to 130 and feeble. The entire thigh was markedly discolored, reaching up almost to the groin. Even the left side of the abdomen and gluteal region were somewhat cyanosed. At 5:00 P.M. temperature was 105° and pulse 150. Systolic pressure 70 to 80. No diastolic. At 5:15 P.M. operation by Dr. Stetten as follows:—

Nitrous oxygen anesthesia with intravenous infusion of Ringer's solution with adrenalin. Re-opening of incision around to exposed artery. Ligation of artery and vein as high as possible. No pulsation whatever to be noted in the artery. Lower portion of wound was sloughing. Upper portion still vital although there was very little oozing. *Disarticulation at the hip* was performed with racquet incision using upper portion of old incision as handle of racquet. Externally and posteriorly there was a considerable foul-smelling secretion in the tissues with some gas which escaped on incising through the muscles. There was practically no oozing at all from cut surfaces except from the sciatic nerve although the muscles still appeared viable. The wound was left wide open and packed with gauze. The operation was ten minutes in duration.

CROSS EXAMINATION:—The leg was totally gangrenous almost from the hip down. A foul-smelling, gas-containing secretion had developed in the musculature. Both the artery and vein were completely thrombosed. The old suture of the artery was noted and seemed intact.

From the beginning of the anesthesia the patient was pulseless but after having received about 750 c.c. of the infusion her pulse began to pick up and her color was better. The usual stimulation was administered but the quality of the pulse was not maintained. The patient died at 6:05 P.M. while being transferred from operating table to carriage. *The final diagnosis* was multiple fibromyomata of the uterus and postoperative embolus of the left femoral artery in its upper portion followed by gangrene of the leg and thigh. Death was due to sepsis and postoperative shock.

Unfortunately no autopsy could be obtained. As to the formation of the embolus in this case I would like to submit the following as the most probable cause:—It was noted at the time of operation that all of the vessels, especially the uterine artery, were markedly enlarged and I take it that thrombi formed in the uterine artery, continued backward into the internal iliac artery and from there into the common iliac artery

where the end piece broke off and was carried in the blood stream down into the femoral artery. Without autopsy, I, of course, have no proof of this assumption but it is a more than probable explanation.

However, the practical value of arteriotomy and embolectomy is illustrated without further comment by the remarkable results achieved by means of this modern procedure in many apparently hopeless cases. In Key's tabulation of the results of thirty-six operations performed within twenty-four hours after the onset of embolism the outcome was favorable in sixteen cases, including two cases of embolism at the bifurcation of the aorta. Success can be obtained only, as pointed out by Buerger, when the arterial wall is still undamaged at the site of the embolism and before the dangerous and extensive secondary thrombosis has occurred.

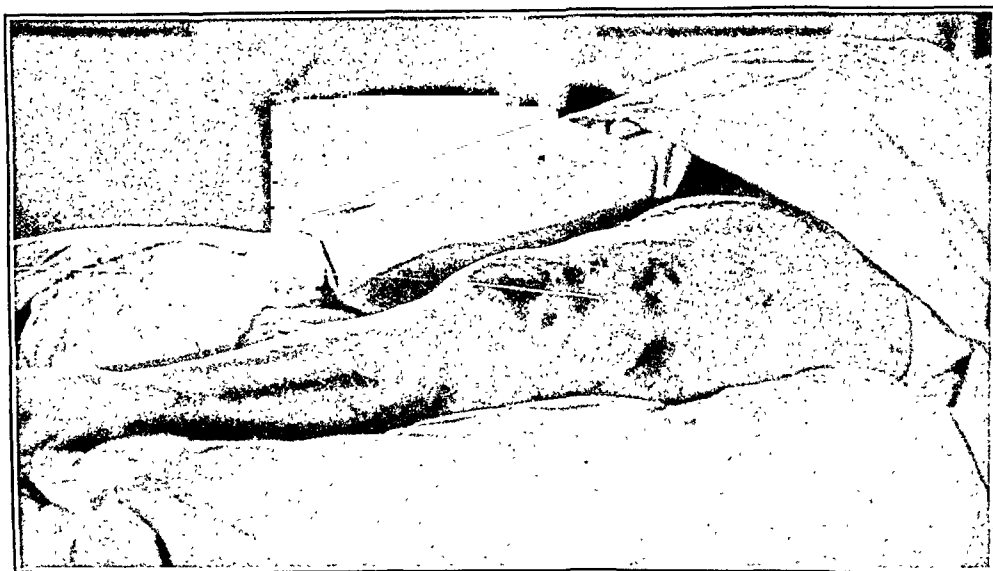


Fig. 1.—Showing gangrene of the left leg, also incision for embolectomy in upper third of thigh.

*Technic of Embolectomy.*—The removal of an embolus through arteriotomy is designated as embolectomy and the procedure represents a more recent addition to the domain of vascular surgery. The number of these operations performed is still rather limited but the application of this intervention is surely on the increase and its outcome has of late been substantially improved. The technic of suturing the vessels is today so generally well known that I shall touch upon only a few details in reference to it. Dr. Stetten and I in our above referred case used the Carrel technic of suturing, namely very fine needles and silk soaked in paraffin. I think however that this might be supplanted by a solution of sodium-citrate as we know from Lewisohn's well known experiments that this prevents coagulation of the blood. The solution has already been satisfactorily used by Key.

After the artery has been laid bare the pulsating portion of the artery

is clamped with a Carrel clamp. The incision is then made and if possible it is made just above the embolus in order to avoid any further traumatism to the intima of the artery. If however it is difficult to incise above the location of the embolus the incision is made at the site of same. The embolus is then gently removed with a very fine anatomic forceps or a fine pincette. In some instances the embolus breaks off and has to be removed in pieces. A small soft rubber catheter is sometimes inserted and remnants of the embolus may thus be removed by means of irrigation.

It is always advisable to remove the central clamp for a moment or two before sewing up as secondary thrombi may arise centrally to an embolus. In this manner the remainder of an embolus or a newly formed thrombus may be flushed out by the blood stream. Before this is done however another Carrel clamp is applied peripherally in order to prevent the flushing of any part of the embolus or thrombus into the peripheral blood vessels. After the artery has been completely cleared suturing takes place and the clamps are then carefully taken off and a few minutes are given over to watching to ascertain that the circulation has been re-established. If it happens, as in our own case, that immediately after removal of the thrombus new thrombi form and the lumen of the artery is again occluded, the artery should be reopened and these secondary thrombi should be removed. It is to be noted that some cases will render two arteriotomies necessary in different localities while in others it may be necessary to make two incisions within the same locality for the purpose of flushing out the artery through both openings.

The first embolectomy was performed by Ssabanejew in 1895 who did an arteriotomy in the femoral artery for the removal of an embolus. The operation was not successful and the patient's death followed amputation of the affected leg. Since that time many attempts have been made to save the patient's limb or life by means of this procedure and as pioneers in this field, the names of F. Stewart and Murphy must be given prominence although a number of their cases were unsuccessful.

Key stands foremost as having met with the greatest success in this field. In his publication of 1923 he records ten operations of this type by himself upon nine patients (in one case there was an embolus in both legs). In these cases operation was performed from two hours to four days after the appearance of the earliest symptoms. Gangrene followed in only four of these cases. In all of the others the results were good.

The brevity of this list of embolectomies is due partly to the fact that this postpuerperal and postoperative complication is of rare occurrence and partly because the procedure is in its infancy.

The lesson taught by perusal of the published cases is that where there is embolic obstruction of a main artery, embolectomy should be performed as promptly as possible, for it has been shown that the sooner this opera-

tion follows the onset of symptoms the better are its chances for success. While the unsuccessful embolectomies at the present time greatly outnumber the successful ones, the value of this procedure should not be underestimated, for its timely application has brought recovery to a number of patients and in cases of complete obstruction of the larger vessels it offers the only chance of saving the affected limb or perhaps averting a fatal outcome.

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# A NEW AXIS TRACTION HANDLE FOR SOLID BLADE FORCEPS\*

BY A. H. BILL, A.M., M.D., CLEVELAND, OHIO

EVERY obstetrician has his favorite type of forceps and becomes familiar with its use. I have, however, seen in the solid blade forceps certain advantages which are not found in the fenestrated

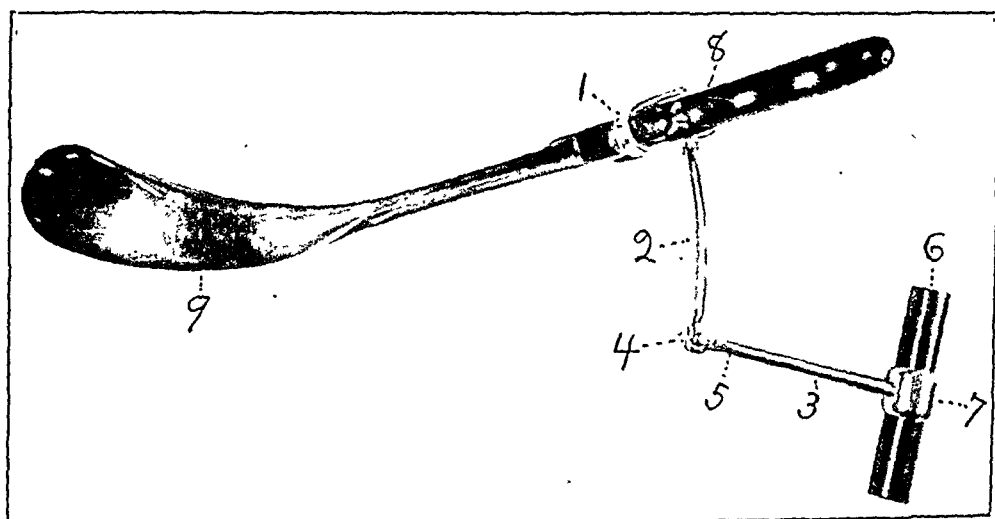


Fig. 1.

instrument. The advantages depend chiefly upon the fact that the thinness and smoothness of the blades make for an easier and there-

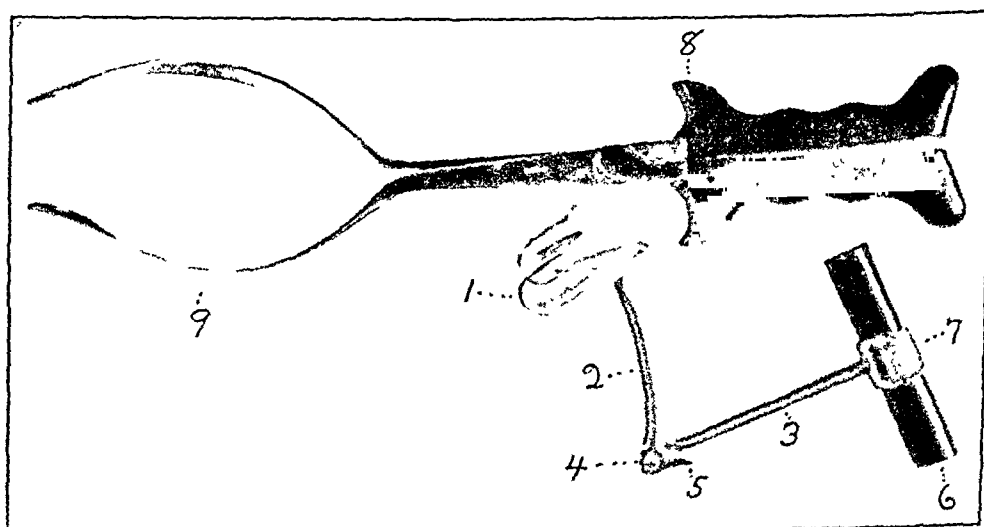


Fig. 2.

fore more accurate application and facilitate rotation in cases of posterior positions. The lack of an axis traction attachment has always

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been felt and the present traction handle is offered to complete the equipment of an ideal forceps.

It is unfortunate that axis traction forceps have to such an extent been associated with high forceps work and with the idea of excessive traction force. That is not at all the object of the writer in proposing the new traction handle. The purpose is to increase the accuracy of traction and thereby minimize the force. In fact the writer does not use this instrument in high forceps work but routinely uses it in low and medium forceps cases.

The traction handle (Figs. 1 and 2) consists of a claw (1) which grasps the handles of the forceps (8) very much as two fingers would grasp them in ordinary traction. The vertical rod (2) joins the claw to the horizontal traction rod (3) in a movable joint (4) and is sufficiently long to reach a line drawn through the axis of the forceps blades (9). The indicator (5) points in this line and when traction is made in the proper direction, points in the line of the rod (3). The grip (6) is attached to rod (3) by a movable joint (7) to allow perfect freedom in traction.

To apply the handle it is not necessary to set any screws but simply slip the claw over the forceps handles. It is therefore very easily removed between pulls. The movable joint (4) allows the handles to rise as the head descends and as they do so the indicator (5) shows the direction in which traction should be made.

The traction handle has been in constant use at the Cleveland Maternity Hospital for nearly three years and has been found most satisfactory. With its use and the accuracy of traction thereby made possible, much less force is necessary in delivering a head. It helps us materially in our efforts to reduce traction force to a minimum.<sup>1</sup>

OSBORN BUILDING.

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<sup>1</sup>The instrument is made by Tieman and Co., New York.

of the bladder is maintained through an in-dwelling catheter (Fig. 6). The complete course of preoperative radium treatment amounts to 5520 mg. hours. This technic distributes the dosage over a relatively long period and is used for the average patient, but is not necessarily constant and may be varied according to circumstances. The dosage has been well borne by all patients, has not caused any clinical manifestations of toxemia or uremia, and fistulae have been conspicuous by their absence. It will be noted that applications to the vaginal vault

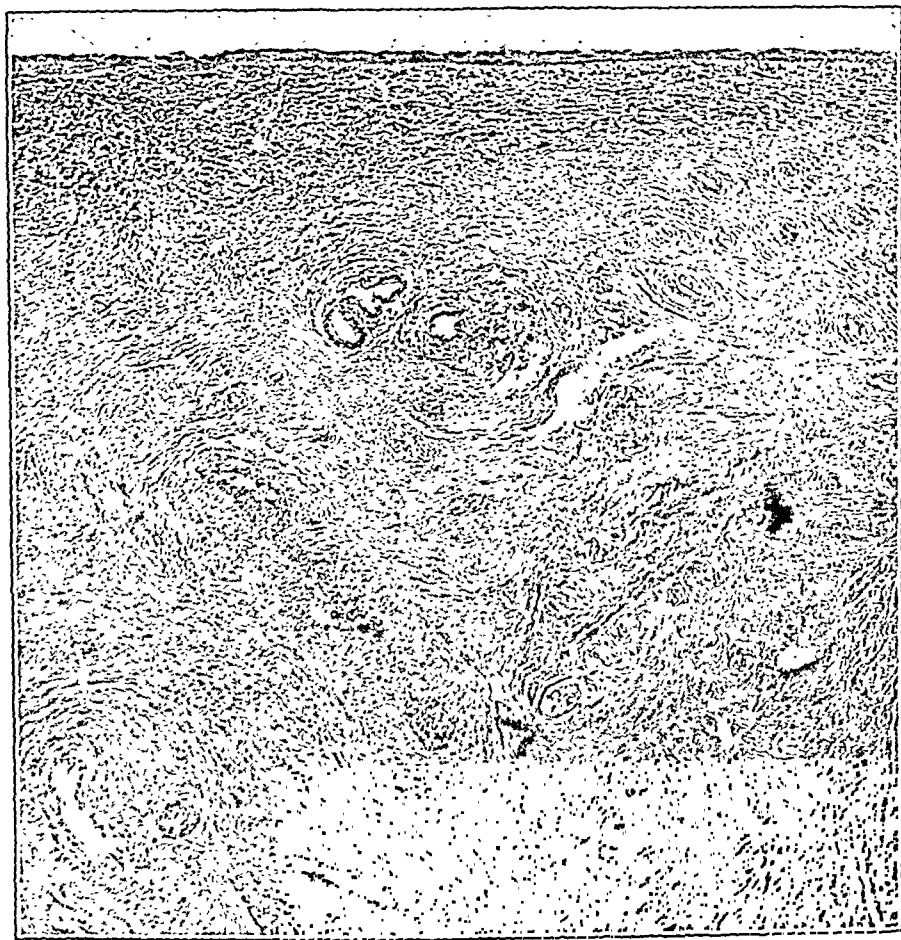


Fig. 5.—Case 28,400. Photomicrograph of section from the cervical canal of the uterus shown in Fig. 4, showing round cell infiltration of the surface and marked atrophy of the mucous membrane.

are not included in the preoperative treatment; they are of course essential in cases where radium therapy exclusively is relied upon for cure.

In several of my cases the effects of the irradiation have been closely followed by taking sections from the same area at the time of each preoperative application. The variations in the tissue reaction observed demonstrate that it is not so much the amount of radiation applied that provokes the response, as the radiosensitiveness of the cells comprising the growth, and the absorptive power of different

swelling of all the cells. In the second week the cords of tumor cells present a characteristic appearance. The nuclei are swollen, homogeneous, and hyperchromatic. The cell bodies are enlarged, the cells loosened, hydropic vacuoles appear in the cytoplasm, and fusion giant cells form. In the third week the number of cells is greatly reduced. Many appear to suffer liquefaction necrosis. Others are invaded and mechanically broken up or compressed by lymphocytes and proliferating stroma. From the fourth to the fifth weeks only pyknotic nuclear fragments or an occasional giant cell are visible, or no traces whatever remain. Meantime the stroma has been active and appears to take an important part in the process. Leucocytes become overabundant, the capillaries proliferate actively, and the stroma is transformed into granulation tissue in which numerous new capillaries penetrate and excavate the tumor cell nests. The gathering of leucocytes, lymphocytes, plasma cells, and polyblasts in the later stages of radium reaction may be extremely profuse, and in this respect the reaction is somewhat specific. Eventually the site of the tumor is occupied by granulation tissue from which slight serous and cellular exudate is discharged. Later, epithelium grows over the denuded surface thus completing the repair."

Ewing has recently stated that further observations have not caused him to modify this description of the histopathologic alterations. The clinical interpretation of this terse and enlightening summary implies: (1) active hyperemia for several days after the application of radium; (2) disintegration of individual cells in direct proportion to the nuclear material present in the cell, mitotic cells being from four to seven times as susceptible as normal cells; (3) "sickening" of many cancer cells not immediately destroyed; (4) the sudden addition of nitrogenous waste products to the blood stream; and (5) fibrosis replacing the malignant growth, after the lapse of several weeks. Assuming these premises to be correct, the biologic changes explain: (1) transitory increase of bleeding, immediately following the application of radium, and why operations within a few days thereafter are attended by unusual technical difficulties, such as free bleeding and tissue friability; (2) why sarcoma is more amenable than carcinoma to radium therapy; (3) why radium therapy sometimes cures cancer, and why there is less likelihood of scattering cancer cells during an operation after pre-operative radium treatment than otherwise; (4) why the patients with advanced and recurrent carcinoma, with greatly impaired metabolic capabilities die soon after intensive radium therapy, and why it is so necessary to adapt the dose of radium to the patient as well as to the growth; and (5) why operations should be postponed until at least three weeks have elapsed since the last radium application.

The radium therapy technic that I have followed conforms in large part with the ideas advanced a few years ago by the late Dr. George Stuart Willis, formerly director of radium therapy at the New York Post-Graduate Medical School and Hospital. It has always seemed to me that preliminary estimation of the patient's metabolic capabilities, represented by the blood chemistry, hematopoietic potentialities, cardiovascular integrity, and renal function is as important before radium therapy as before prolonged anesthesia and operation; and a patient with a high nitrogenous blood retention, or pronounced anemia, or greatly impaired renal function, is no more a candidate for the one than the other.



These facts have been verified by Henry Schmitz,<sup>2</sup> who has demonstrated that the increased absorption of autolytic products, incident to radium therapy, is responsible for a pronounced increase in the nonprotein nitrogen and urea nitrogen of the blood. As a result of his chemical and serum examinations of the blood of carcinoma patients with extensive and necrotic cancer tumors, he goes so far as to conclude that "patients with advanced carcinomata should not be subjected to radium therapy." However, gentle stimulation of the emunctories, blood transfusion, physical rest, a high calorie diet, and the treatment of existing heart lesions, hypertension, and nephritis, all augment the patient's vital resistance and recuperative powers, so that at a later period the blood stream may tolerate and the kidneys eliminate the excess of nitrogenous waste products.

Clinically, cases of cancer of the uterus may be divided into three groups: (1) those in which the disease is confined to the uterus, and the uterus is mobile; (2) those showing beginning involvement of the parametrium, with restricted uterine mobility; and (3) those with involvement of adjacent structures and uterine immobilization. This paper has no reference to patients coming within the third group.

Preoperative radium treatment has appealed to me because: (1) I have found that many early cases of carcinoma, particularly those of the transitional or cylindrical cell type, are apparently cured by it; (2) even in cases of the epidermoid type, fibrosis replaces a large part of the neoplastic growth; (3) some borderline may be converted into operable cases; (4) there is "sickening" of the cells not destroyed, and therefore less likelihood of dissemination during operative manipulations; (5) it controls bleeding and restricts the malignant process, thus allowing time for building up the patient; and (6) knowing that most of the cancer cells have undergone necrobiosis, the hysterectomy need not be nearly so extensive as the classical Wertheim operation. Anteoperative radium therapy has disappointed some operators because of increased hemorrhage during operation, postoperative pelvic peritonitis, or a sclerosis of the parametrium. The first two untoward effects are due to operating too soon after the last radium application, while the third can be lessened by avoiding vaginal applications in the preoperative treatment, and is of little consequence unless a radical operation is performed. With a more conservative method of extirpation, taking the "short cut" across the parametrium close to the cervix and vagina, as described by Graves,<sup>3</sup> the failure to find lines of cleavage is not so important.

I believe that needles containing one of the salts of radium are superior to emanation seeds. I also believe that it is wiser to use what may be termed a moderate dose in tubes frequently repeated, for the preoperative uterine applications, rather than to use a mass

sive dose at one sitting; not only because the latter method may result in increasing the patient's toxemia and overtaxing her capacity for elimination, but also because the former procedure sustains a more prolonged round-cell infiltration and stimulates the proliferation of connective tissue fibers to such an extent, that the consequent compression of blood vessels is distinctly more pronounced (Fig. 1). I have therefore adopted the plan of excising a piece of tissue for microscopic examination, performing a diagnostic curettage, and thrusting six 5 mg. platinum needles directly into the diseased area or carcinomatous cervix, in all cases in which the diagnosis of malig-



Fig. 1.—Case 37,185. Photomicrograph of section from the cervix, showing tremendous thickening and compression of blood vessels due to the proliferation of connective tissue, after full course of radium treatment. No traces of carcinoma could be found in serial sections from the uterus or parametrium.

nancy is anticipated or has been made (Fig. 2). Any patient who is a proper subject for radium therapy can tolerate this preliminary small dose so that no time need be lost while investigating her physical condition. At the same time, simultaneous biopsy and radium application minimizes the danger of spreading the malignancy by cutting into it. These needles make it possible to distribute the radium rays from the growth itself, produce homogeneous crossfiring over a wide area, will control bleeding in the average case within five days, and constitute a marked advance in radium therapy. They are left *in situ* for twenty-four hours, which makes a dosage of 720 mg. hours.

This is not necessarily sufficient to produce an artificial menopause if the condition is found to be benign, and at the same time is adequate

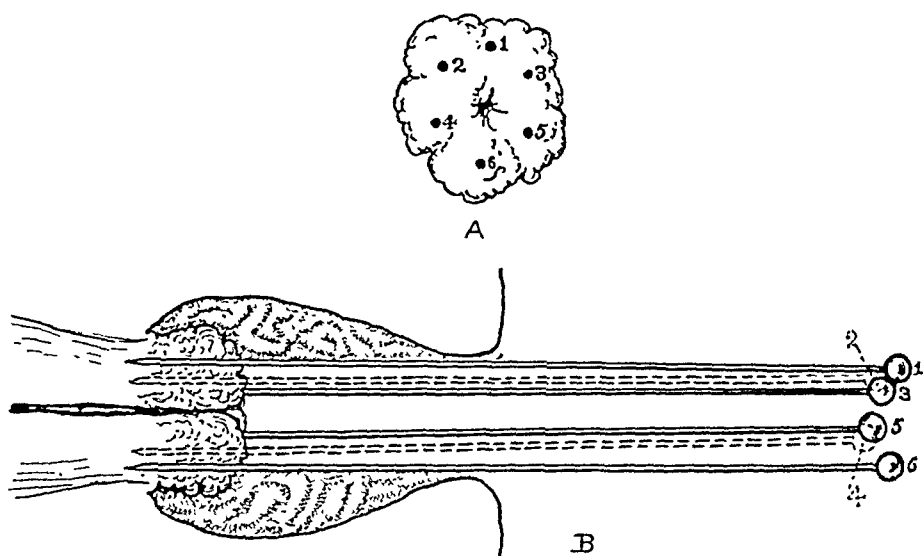


Fig. 2.—A, Representation of carcinomatous cervix, showing location of radium needle applicators. B, Sagittal view of radium needles thrust into carcinomatous cervix. Vaginal gauze packing surrounding the needles.

in the truly malignant cases to arrest the process for a few days while the patient is being studied.

As soon as the patient's blood components, blood chemistry, and

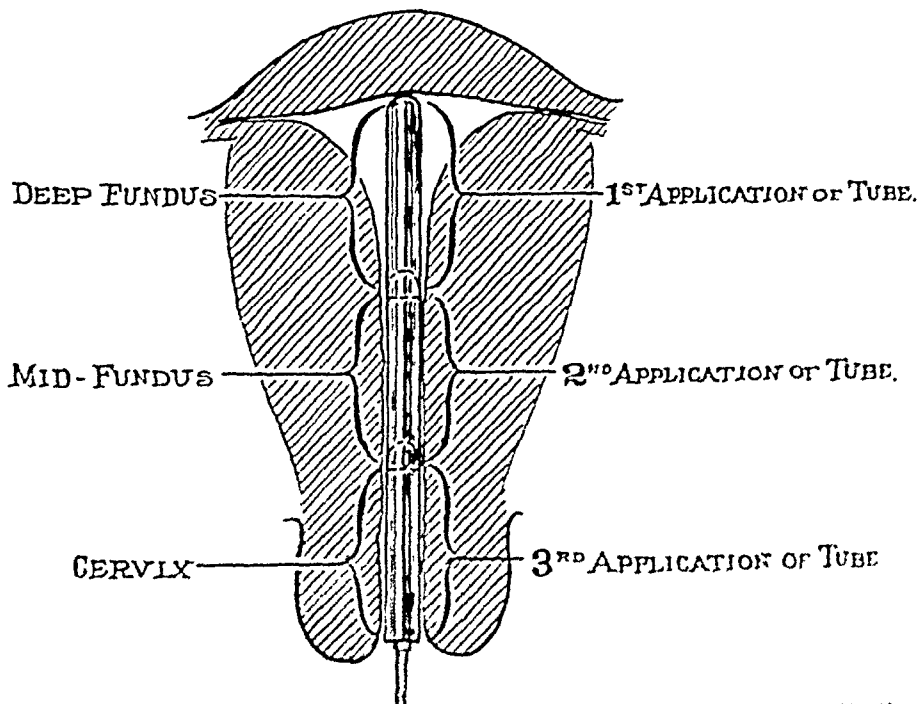


Fig. 3.—Diagram illustrating the technique of making the intrauterine applications

renal function are found to be reasonably near the normal, a 50 mgr. tube of radium is placed in the upper limit of the uterine cavity (deep fundus), and left for twenty-four hours. A few days later the same

tube is introduced only so far as the center of the cavity (mid-portion), and left for twenty-four hours. After the lapse of another few days the tube is inserted in the cervix for twenty-four hours. The patient is then dismissed for four or five weeks, when she returns for another twenty-four hour application to the cervix. Examination at this time discloses an improvement in the patient's general physical condition, increased uterine mobility, all traces of malignant disease have practically disappeared from the cervix, and the uterus itself seems atrophied. Since it is impossible to determine accurately the extent of involvement of the endometrium, irradiation of the entire uterine

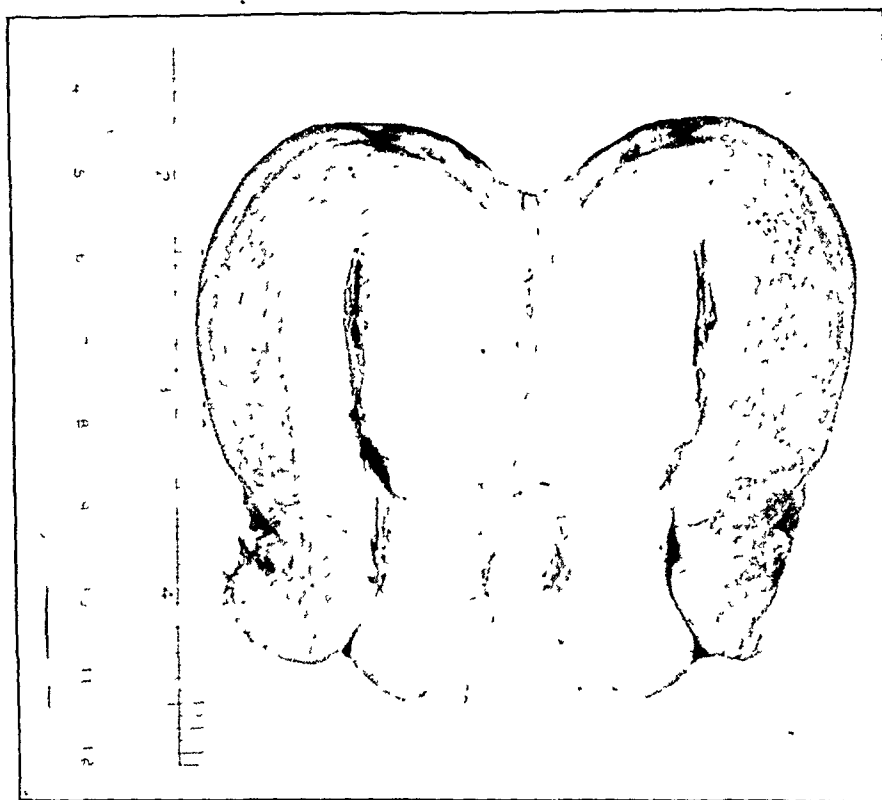


Fig. 4.—Case 28,400. Extirpated uterus after a full course of preoperative radium treatment, showing extensive fibrosis. The obliteration of the cervical canal at the level of the internal os is evident. This was a borderline case when first seen, the cervix being extensively involved and the uterine mobility distinctly limited.

cavity seems desirable. The intrauterine applications are made from above downwards, although it would seem more logical to ray the cervix first (Fig. 3). So much stenosis of the cervical canal, however, may follow the cervical application within a short time, that repeated introduction of the tube may be seriously obstructed (Figs. 4 and 5). Gas-oxygen anesthesia is used for the insertion of the radium needles, but has been found unnecessary in most cases for the subsequent intrauterine treatment. Whenever radium applications are made to the uterus, the vagina is packed firmly with iodoform gauze, to push the bladder and rectum as far away as possible, and constant drainage

*logic laws governing the recessive characteristics illustrated in phylogenetic changes and in other congenital deformities.*

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carcinomas is not uniform. Squamous cell growths seem to be more resistant than the cylindrical and transitional cell types, and in tumors in which both types of cells are present, the squamous cells predominate long after the basal have disappeared (Figs. 7 and 8). One can therefore never be sure that all the nests of cancer cells have been destroyed, although in many cases there is complete regression of the tumor. This constitutes the first argument in favor of operation. While sections from most of my extirpated specimens show the parametrium to be free from cancer cells after the preoperative therapy,

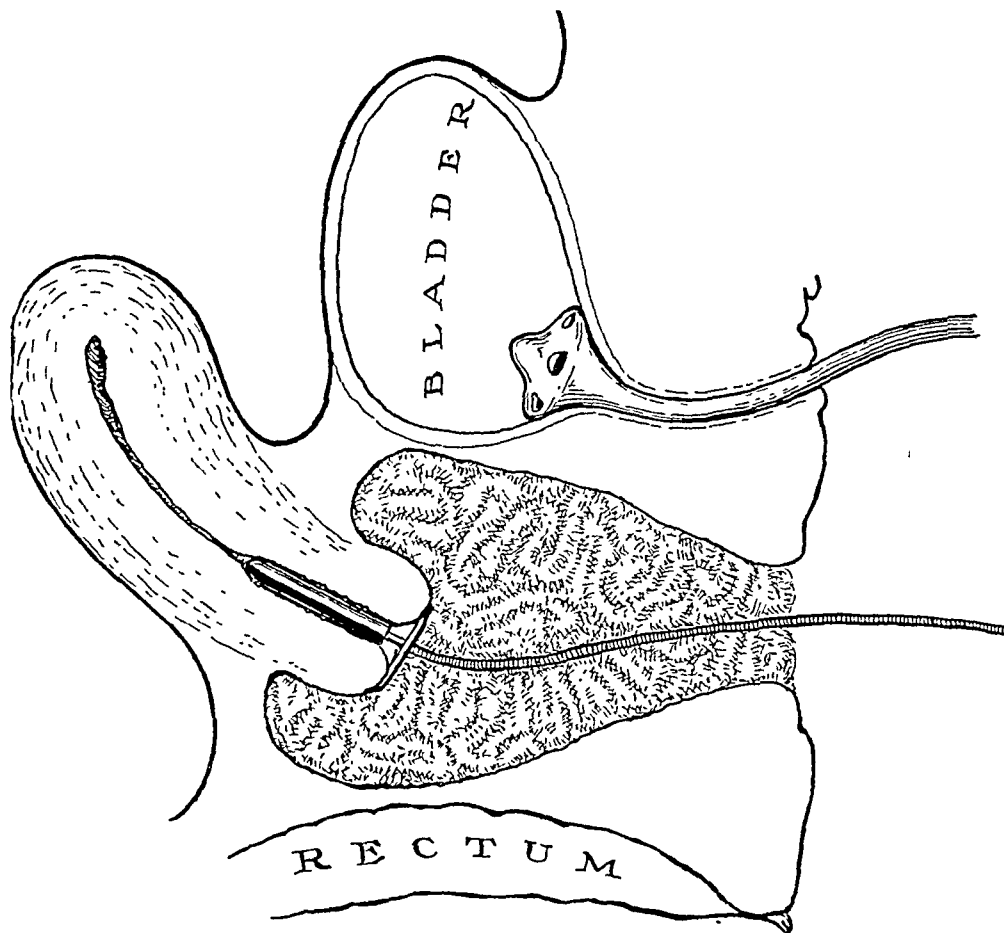


Fig. 6.—The vaginal fornix is packed firmly with iodoform gauze, pushing the bladder and rectum away from the tube. The Pezzet catheter keeps the bladder empty.

the efficient and sufficient dosage of the cellular pelvic tissue is uncertain. A panhysterectomy, from which I have so far had no primary mortality, removes a large bulk of filtering tissue between the radium tube and the parametrium, close to the bony pelvis, and this is another reason for operation. In other words, the postoperative irradiation can reach the parametrium without a large amount of filtration by the uterus and its appendages.

In a recent article,<sup>4</sup> Ewing says, "the results of radiation require some modification of the established theories regarding metastasis in

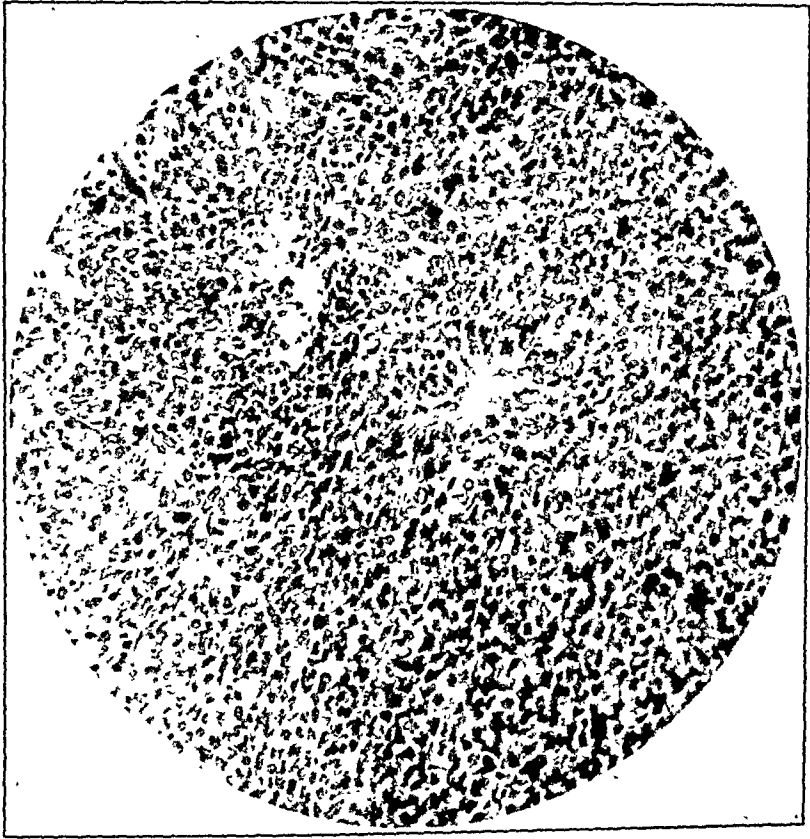


Fig. 7.—Case 42,093. Photomicrograph of biopsy section, showing transitional cell type of carcinoma of the cervix, with bulky spindle cells in the greater part of the tumor.



Fig. 8.—Case 42,093. Photomicrograph of specimen taken from same patient as the one in Fig. 7, after two radium applications. The squamous cells are now outstanding and predominant.

certain tumors. The wide sterilizing action of gamma rays seems to take care of the area of permeation, so that in most cases the lymph nodes may be dealt with without block dissection, since the intervening lymphatics are not filled with cancer cells, except in late cases when growth in both directions may have occurred \* \* \* When extirpation and block dissection were the only resources in dealing with infected lymph nodes, the radical surgical procedure was perhaps justified, but with radiation to support surgical extirpation, the outlook for cases with metastases is not so unfavorable, and it seems legitimate to adopt a more conservative plan, which will test the theory of continuous permeation." This seems to corroborate the opinion that I have long held, that, with preliminary radium applications in early cancer of the uterus, a panhysterectomy may be safely substituted for the more dangerous radical operations.

As soon as the line of union in the resected vaginal walls is firm, 50 or 100 mg. of radium is placed in a lead container (closed on the ends and on three sides), directed toward the parametrium, and left for 24 hours. Three months later this treatment is repeated. After another three months have elapsed, the vaginal roof is usually found so atrophied and contracted that it will not accommodate the radium applicator. In such case, 100 mg. of radium or high voltage x-ray is used externally. This crossfiring is carried out again in another three months. During the second and third postoperative years treatments are given every six months.

The histopathologic sections from all my cases have been carefully studied at the Post-Graduate Hospital by Dr. Paul Klemperer, to whom I am under deep obligation for his enthusiastic collaboration. I shall refer to him for the details of the tissue changes that he has observed after radium therapy, the description of the serial sections from the extirpated uteri, and the demonstration of the photomicrographic slides.\*

#### CONCLUSIONS

From my clinical experience, and the histologic examination of several uteri extirpated after radium treatment, the following deductions seem justified:

1. The clinical behavior of cancer of the uterus under the influence of radium radiation can be checked by repeated histopathologic examinations.
2. For diagnostic purposes, it is important to curette the uterus when the first biopsy specimen is taken, to determine the extent of involvement of the endometrium.
3. Preliminary study of the patient's metabolic capabilities and cor-

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\*See article by Dr. Klemperer, this issue, page 619.



rection of cardiac, renal, and hematogenous abnormalities are essential before intensive radium therapy.

4. All cases of cancer of the uterus should receive full doses of radium. It is a mistake to attempt to modify the dosage according to the histologic type of growth.

5. Treatment of the entire cavity of the uterus from above downward is of paramount importance.

6. Radium treatment should be supplemented by a panhysterectomy, because (1) complete destruction of all cancer cells in all tumors is uncertain, (2) the operation removes a large bulk of filtering tissue between the radium tube and the parametrium, and (3) because of its scientific value. Radical operations are unnecessary after thorough irradiation.

7. Extensive sections of extirpated uteri are a better criterion of cure than the lapse of any particular period of time, although each test is complementary to the other.

8. Postoperative irradiation should be given as a prophylactic against recurrence.

9. Histopathologic data must be added to clinical statistics before the latter are worthy of serious consideration.

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(For discussion, see p. 711.)

## HISTOPATHOLOGIC CHANGES IN UTERINE CARCINOMA TREATED WITH RADIUM\*

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and Hospital)*

THE value of the histologic examination of uterine carcinoma during and after radiation treatment can be considered as twofold. The opportunity to study the material under the immediate influence of radiation has greatly advanced our knowledge of the action of rays on carcinomatous tissue and has contributed new information regarding the natural history of carcinoma. This advance in our knowledge is equally important for the gynecologist engaged in the practical application of radiation as well as for the pathologist devoted to the theoretical problems of tumor growth. Their combined efforts have already led to certain general rules in the radiation treatment. Notwithstanding these conclusions in general, however, the value of repeated histologic examination for each individual case must not be overlooked. The histologic examination during radiation serves as a check upon the efficacy of the treatment and the exact examination at the conclusion of treatment will determine its success, and consequently the prognosis.

My association with Dr. Henry Schmitz in Chicago and Dr. Walter T. Dannreuther in New York has afforded me an unusual opportunity to study the influence of radiation upon the histologic structure of uterine carcinoma. The latest publications of Dr. Schmitz contain the results of the histologic examination of carcinomata treated with combined radium and x-rays, whereas in Dr. Dannreuther's cases only radium was applied. Notwithstanding the pros and cons in regard to the therapeutic value of radium or x-ray or combined application, we know that the morphologic effect of the rays on the carcinoma cells is identical.<sup>1</sup> Since the present study has been concerned only with certain points of the histologic aspects of the radiation problem, we may safely draw our conclusions from both sets of material.

The general influence of radiation on carcinomatous tissue has already been described by so many authors that I may be allowed to restrict myself to a few pictures which exhibit the classical features during ray activity; the changes of the carcinoma cells and the proliferation of the stroma (Figs. 1 and 2).

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\*Read before the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18-20, 1924.

The different sensibility of normal and neoplastic cells toward radiation has been the basic principle of its therapeutic application. The observations of the numerous workers in this field have disclosed the fact that various types of tumors differ in their sensibility toward rays. But even apparently identical tumor types do not always react in the same way. To determine the causes of these differences seems to me the most important problem of radiology. Although histologist by education and profession I do not hesitate to confess that the solution of our problem cannot rest with mere morphologic observation. But the histologic analysis might prove helpful in our

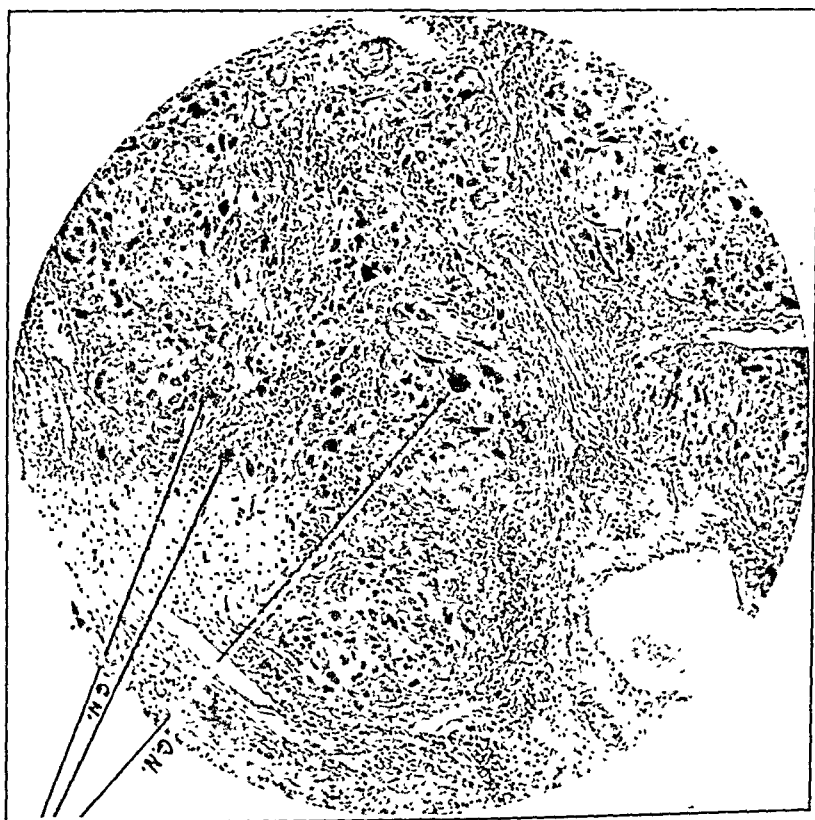


Fig. 1.—Squamous-cell carcinoma of cervix, nine days after first insertion of radium needles. G.N., Giant nuclei.

task and with this viewpoint in mind we have studied the effect of radiation on the different histologic types of uterine carcinoma.

The law of Bergonier and Tribondeau that embryonal cells are more sensitive toward radiation than the adult cell types has been confirmed by one group of authors who investigated the influence of rays on uterine carcinoma. Alter,<sup>2</sup> Ewing<sup>3</sup> and Schmitz<sup>4</sup> have found that the so-called basal-cell carcinoma of the cervix responds much more quickly and better to radiation than the squamous-cell and the cylindrical-cell types. From that observation Schmitz<sup>4</sup> has drawn the practical conclusion that basal-cell carcinoma requires a smaller destructive dose than the adeno and the squamous-cell carcinomata of the

uterus. Other authors, however, have come to opposite conclusions. Adler,<sup>5</sup> for instance, in a review of almost 200 cases emphasizes the fact that the unripe carcinomata are far more resistant than the riper forms. Regaud in a recent lecture takes the same stand. Lahm<sup>6</sup> found that unripe cervical carcinomata require higher doses of radiation than the medium and ripe forms. My own experience formerly agreed rather with the first-mentioned viewpoint, but recent observations have caused me to modify the opinions I had previously. The effect of radiation is determined not only by the tumor type but also by the extension of the growth, the age and general condition of the



Fig. 2.—The same as Fig. 1. Proliferation of fibrous tissue and lymphocytic infiltration.

patient and the amount of ray application. The number of determining factors makes it difficult to select cases suitable for comparison. This difficulty may account for the great divergency of opinion and it may explain our own somewhat uncertain position.

Notwithstanding these limitations in general, however, certain histologic features of the so-called basal-cell carcinoma of the cervix necessitate further consideration.

In his first publication on basal-cell carcinoma Krompecher<sup>7</sup> mentions carcinoma types which show, besides the classical basal cells, transitional forms toward the true squamous cell. Kermauner and Schottlander, in their classification of cervical carcinoma, use the term

"medium ripe" carcinoma for these transitional forms. Every experienced pathologist knows the cases in which a definite diagnosis as to the exact type can hardly be made. We may distinguish two forms of transitional carcinoma; one in which the cells neither conform with the spindle-shaped cells of the basal-cell type nor with the ripe pavement cell (Fig. 3) and the other in which, besides islands of basal cells, foci of ripe squamous cells are found (Krompecher<sup>8</sup>). Similar pictures can be discovered in every carcinoma originating from the surface pavement epithelium. Yet, not only in these forms, but even in true adenocarcinoma of the corpus uteri, foci of squamous-cell



Fig. 3.—Transitional cell carcinoma of cervix before treatment.

cancer are not uncommon (Fig. 4) (Hitschmann,<sup>9</sup> Lahm<sup>10</sup>). Schridde<sup>11</sup> and Aschoff<sup>12</sup> explain this occurrence not as the result of previous metaplasia but by the assumption that the epithelium which initiated the carcinomatous formation differentiates in various directions. These, so to speak, mixed types of carcinoma, are by no means uncommon but they remain sometimes unrecognized if one has failed to examine several different portions of the carcinoma. That will, however, occur as a rule in the histologic examination of biopsy specimens, where only one small piece is submitted for the pathologic analysis.

The difficulty of an unbiased classification of these tumor types is

evident. Schmitz includes the medium ripe with the ripe forms and applies the squamous-cell dose. Adler, however, considers these transitional forms as less resistant than the unripe types. Other observations of my own called for further consideration. In three cases of picture of basal-cell carcinoma (Figs. 5, 6, 7 and 8 in Dr. W. T. Dannreuther's paper, see pages 614 to 616, this issue). Yet a subsequent examination during the treatment revealed the predominance of squamous cells. (Fig. 6.) These pictures permit two ways of explanation. It might be conceived that previous undiscovered squamous cells have survived the radiation which proved destructive for the less resistant basal

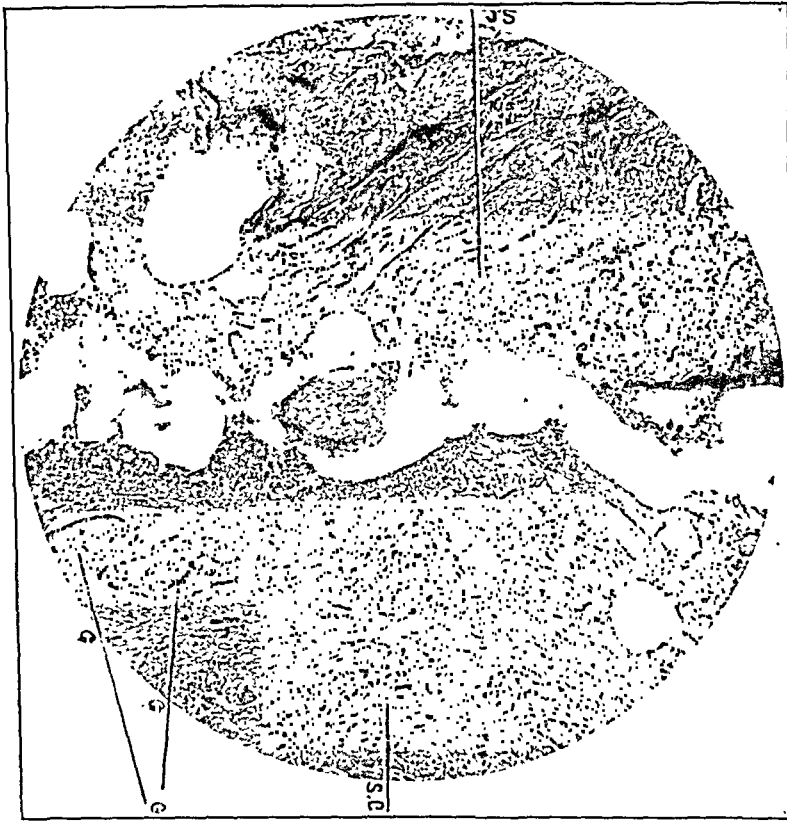


Fig. 4.—Corpus carcinoma. *G*, Irregular glands; *S.C.*, islands of squamous cells.

cells; or we have to consider a transformation of basal cells into squamous cells under the influence of the rays. The latter conception is sustained by the experience of other authors. Aschoff<sup>13</sup> apparently has seen the same transformation in the first cases treated by Kroning and Gauss. He reports three cases of basal-cell carcinoma of the cervix which, during the treatment, changed into hornifying squamous-cell carcinoma. Similar changes have been observed by Oberndorfer,<sup>14</sup> Prym<sup>15</sup> and Haendly.<sup>16</sup> Alter<sup>2</sup> states that radium rays have a very marked accelerating effect on the process of differentiation in the prickle-cell carcinomas. Even the transformation of cylindrical cells into squamous cells has been reported by Oberndorfer, who found the

mucous glands of the esophagus lined by squamous cells after mesothorium treatment. Which explanation of that transformation holds true in any individual case depends on the histologic picture, but the decision might be extremely difficult, even subjective. Whether such a transformation is favorable, as Aschoff maintains, or unfavorable according to the conception of the higher resistance of the squamous cells, I dare not decide.

The foregoing considerations and observations can be briefly summarized, as follows: 1. The question as to the difference in the radiosensitivity of the different histologic types of uterine carcinoma is

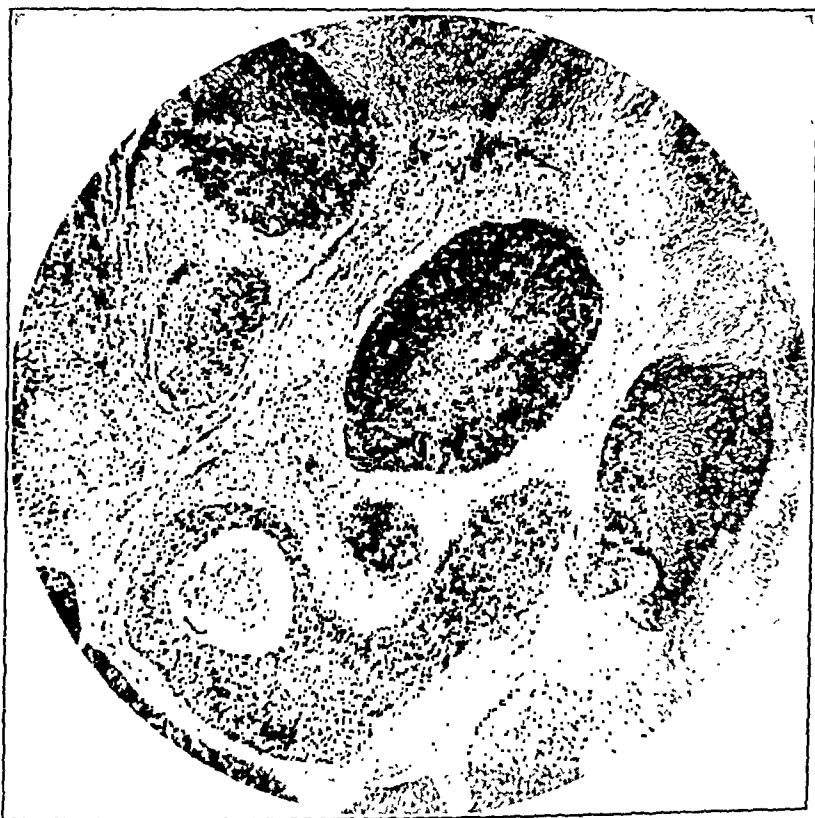


Fig. 5.—Basal-cell carcinoma of cervix before treatment.

still controversial. 2. The occurrence of transitional types and mixed forms of ripe and unripe cells must be considered. 3. Several observations indicate the occurrence of transformation of unripe into ripe forms during treatment. 4. Histologic examination during the treatment controls the effect of radiation and only by repeated examination can mistakes in the exact diagnosis of the tumor type be avoided.

Two conclusions can be drawn from these considerations: First, the importance of repeated histologic examination during radiation, a procedure which obviously is only possible in case of prolonged treatment. The second suggestion, however, is the application of high unit doses of rays in all cases of uterine carcinoma. The technic of radium

treatment followed by Dannreuther complies with these conclusions and the results of his treatment, which were checked by careful histologic examination of uteri removed after treatment, are very encouraging (Fig. 7).

Another advantage of his method seems to me the application of radium to the entire surface of the endometrium from above downward. Dannreuther and I believe that extension of a cervical carcinoma into the uterine fundus must be assumed until disproved by microscopic examination of scrapings from the cavity, and curettings from the endometrium should always be submitted with the cervical growth for histologic examination. But even in case a painstaking\*



Fig. 6.—Same as Fig. 5, insufficiently treated with radium. One treatment with 1800 mg. hours. Compare the type of cells with that of Fig. 5.

examination of the curettings should prove negative it seems justified to treat the entire uterine cavity. For, a *restitutio ad integrum* of the carcinomatous uterus cannot be the aim of our treatment at present and, therefore, it seems advisable to control from the first a possible extension into the uterine fundus. Recently a case has been referred to us by another surgeon in which this precaution had not been taken. It gave full evidence that, as expected, a mere treatment

\*We consider the examination of frozen sections of uterine scrapings, which possibly contain very few foci of carcinomatous infiltration, as absolutely unreliable. An exact diagnosis can only be based on the examination of several paraffin or celloidin sections.



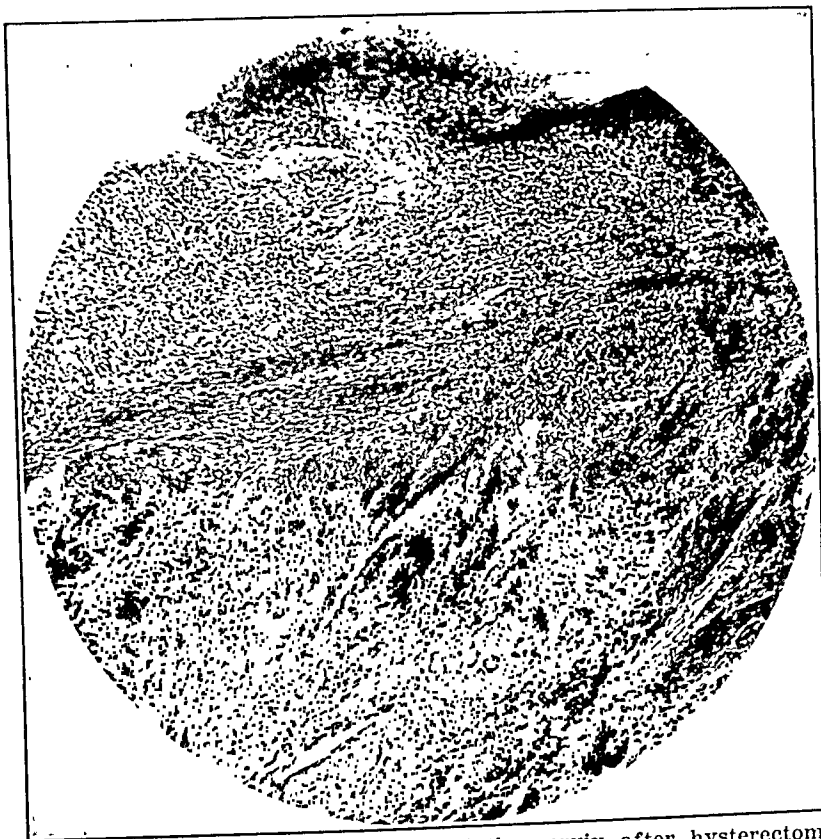


Fig. 7.—Treated transitional carcinoma of the cervix after hysterectomy. Compare Figs. 7 and 8 in Dr. W. T. Dannreuther's paper which illustrate the same case before and during radium treatment. The picture is one of the series of sections from the cervix in none of which tumor cells were found. Lymphocytic infiltration of the surface.



Fig. 8.—Transitional cell carcinoma insufficiently treated with radium. Total, 1850 mg. hours. The cervix did not show changes on gross examination. *Ly. v., carcinoma nests in the lymphatics.*

of the cervix in case of infiltration of the uterine cavity could not prevent the progress of the carcinoma in the uterine wall.

The last question I want to discuss briefly is the hysterectomy after treatment. It is evident that here the pathologist is only entitled to an opinion and has not the prerogative of making a suggestion. The question can be regarded from two angles; first from the standpoint of the therapeutic usefulness in the individual case, and second, from the viewpoint of scientific value. The first point has been discussed at length by Dannreuther and I want only to add that a definite evaluation of the therapeutic result can only be reached after a painstaking histologic examination of the removed organ. A clinical examination, even the gross study of the uterus, is insufficient. I have one case on record in which an experienced pathologist failed to find any gross changes in the cervix after treatment, which on histologic examination proved to be extensively infiltrated by carcinoma (Fig. 8). The prognosis and the further therapeutic efforts will certainly greatly depend on the results reached by radiation on the primary growth. From this standpoint alone the hysterectomy after treatment seems to be advisable in the interest of the patient. Its importance for scientific research, however, is above any question. Our knowledge of the effect of radium is based on morphologic findings, and we are still far from the day when we can safely dispense with the control of the microscope on the results of radiation treatment. The chief aim of the therapy is the complete eradication of the malignant growth and any new method or new device must be tested by the anatomic evidence, unless we return to the age of speculation in medicine.

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(For discussion, see p. 711.)

## OVARIAN TRANSPLANTATION\*

### AN EXPERIMENTAL STUDY OF TRANSPLANTATION OF IMMATURE RAT OVARIES INTO SEXUALLY MATURE CASTRATED RATS

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THE study of organ transplantation opens up one of the largest and most extensive fields of surgical research. The immense value of the solution of this problem is quite obvious and its application would be truly universal. Much work has been done in this field, and in recent years, owing to the centralization of effort upon the gonads, and owing to the irresponsible and inaccurate claims that have been so frequently made, it is more necessary than ever to attack the subject with methods that can be duplicated in all research laboratories and to present data that can be examined openly and impartially.

For the consummation of a successful graft, several factors come into play. The first and most fundamental one concerns the nutrition of the transplant. This necessitates a technic that will allow for excretion of noxious tissue fluids from the graft and for the reception of nutritive fluids from the host by osmosis, until such time as is necessary to allow for the development of capillaries for the permanent feeding and adoption of the transplant as part of the host proper. No matter how favorable and propitious all other considerations may be, if the technic is faulty to an extent that allows an infection to take place, the graft will succumb. An infection reduces the vitality of the transplant and saturates it and, also to a greater or lesser degree, the tissues of the host with toxins resulting from autolysis of the degenerating tissue. In addition to this, it also interferes with the most vital process of obtaining nourishment from the host by the obstructing wall of leucocytes and dying cells found in the zone of infection.

These two factors, nourishment and asepsis may be considered the mechanical preliminary necessities for a successful graft. They, however, constitute only the initial step towards success. We now come to the far more complicated biochemical and physiologic factors. These do not concern autografts and numerous authentic reports are at hand to prove this. We are familiar with the wonderfully successful transplantation experiments that botanists, i.e., Luther Bur-

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\*Read at a meeting of the New York Obstetrical Society, January 13, 1925.

bank, etc., have carried out with heterografts. In animals low down in the scale of evolution, there have also been many successful heterotransplants.<sup>1</sup>

Schoene<sup>2</sup> points out two factors that obtain in plant tissue that do not exist in animal grafts. First the plant graft generally has buds, that contain embryonic tissue capable of independent growth; and, secondly, the plant synthesizes its nutrition from inorganic substances that it draws both from the earth and from the air. The latter factor especially differentiates plant graft from animal graft, as the animal graft is never under any condition an independent self-sustaining body and cannot sustain life from inorganic substances. Schoene concludes (pp. 25, 26) both from his own observations and from those of Ehrlich<sup>3</sup> that the cause of failure in heterografts is due to differences in metabolism resulting in inability on the part of the graft permanently to assimilate the protein-split products of the host and also in the absence of substances within the host necessary for the existence of the graft proper. These metabolic differences are more marked, where the relationship between the two species is more distant, and in this way he explains the varying intervals of time preceding the death of grafts in different species of animals.

For all practical purposes, however, the field of research in transplantation studies concerns the homograft—in other words, the transplantation of tissues and organs from one individual into another, both belonging to the same species. The number of factors involved is so great that the writer in this study limited himself to but two of them, namely, (1) function; (2) growth potentiality. In these experiments laboratory-bred white rats were employed. Young, robust, sexually-mature animals were selected to act as hosts. The ovaries of rats varying in age from one to twelve days were taken for grafts. In order to obtain the largest possible surface for contact with the tissue of the host and thus to allow for the most rapid and most extensive food supply, the ovaries were cut into several small sections with fine sharp scissors, just prior to insertion into a muscular canal that was prepared in the anterior abdominal wall of the host.

*Procedure.*—The host was anesthetized and prepared for laparotomy by shaving the hair on the anterior abdominal wall. The skin was then painted with tincture of iodine and the peritoneal cavity opened in the midline. The ovaries were now brought into view and excised *in toto*. This was done in such fashion as to make absolutely sure that no ovarian tissue was left behind. After both ovaries had been removed, a fine sharp-pointed, straight scissors was pushed through the peritoneum into the abdominal muscles forming a tunnel about three-quarters of an inch long and one-eighth inch wide. This groove was placed about one-half inch from the abdominal incision and parallel with it. In some animals where two grafts were made, two tunnels were bored, one for each transplant. The host was now fully prepared for the reception of the ovarian graft. The animal that was to be employed as the donor was now anesthetized, the anterior abdominal wall painted

with iodine and the peritoneal cavity opened. The ovary was excised, cut into several small fragments and immediately introduced into the canal already prepared in the anterior abdominal wall of the host. This procedure was followed in this

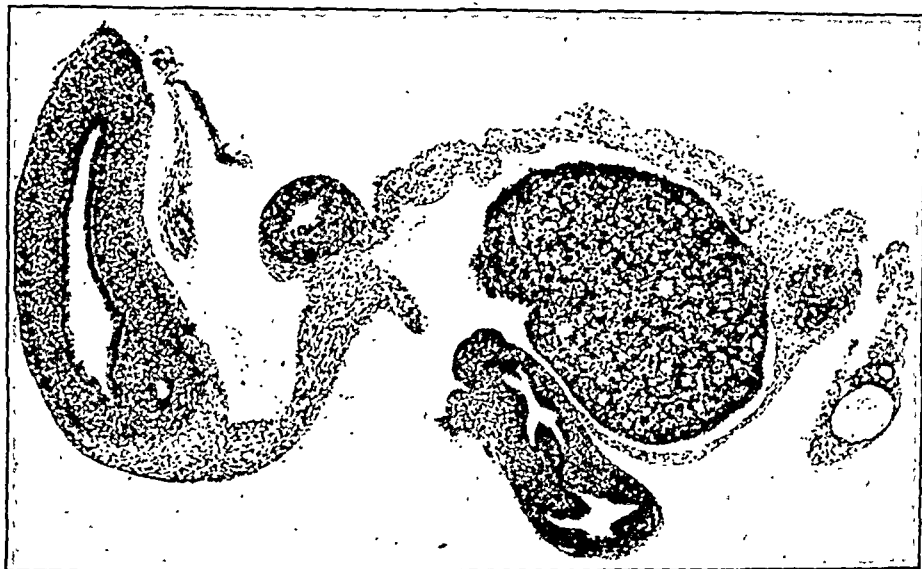


Fig. 1.

sequence in order to prevent drying and hence injury to the graft. The opening of the groove in the abdominal wall of the host was closed with a fine black silk suture thus marking the site of the graft. The host was sacrificed at varying



Fig. 2.

intervals of time after the operation and the graft was removed en masse with the surrounding tissue and immediately placed in Zenker's solution. Complete serial sections were made. Eosin and hematoxylin were used to stain the tissue. For

controls, a similar series of experiments were carried out, employing mature rats as donors. The technic was the same in all other respects.

#### PROTOCOLS

(1) No. 22208. Ovary from rat five days old (Fig. 1). This picture shows a cross section of the ovary, studded with primordial follicles. These consist of the

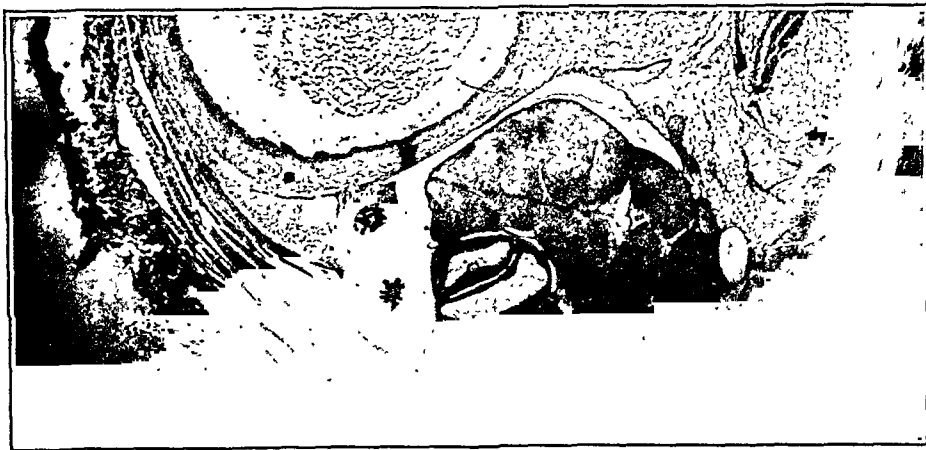


Fig. 3.

immature ovary surrounded by a single layer of epithelial (granulosa) cells. The follicles are so abundant, that practically no stroma tissue is visible.

(2) No. 21798. Ovary from rat three days old at time of removal. Transplanted into mature castrate and removed eight weeks later. Sections from this



Fig. 4.

ovary show the picture of a fully developed normal ovary. There are seen mature normal graafian follicles and corpora lutea of different ages denoting more than one cycle of ovulations. (Fig. 2.)

(3) No. 21996. Ovary taken from rat four days old and implanted into a mature castrate. (Fig. 3.) Removed ten weeks after grafting. Here too the



FIG. 5.

microscopic picture is that of a fully developed perfectly normal ovary, showing mature graafian follicles and numerous corpora lutea of various ages, the older ones containing in their centers varying quantities of fibrous connective tissue.

(4) No. 22033. Ovary taken from rat four days old, implanted into a mature castrate and removed twelve weeks after grafting. (Fig. 4.) Here again the microscopic picture shows very clearly and definitely graafian follicles on full maturity and many corpora lutea that are the outcome of successive cycles of ovulation.

(5) No. 22559. Ovary from rat twelve days old, implanted into a mature castrate and removed forty-one weeks after grafting. (Figs. 5 and 6.) This is the most valuable of all the grafts in this series, as it shows the transplanted organ nine and one-half months after the graft had been made, in a state of perfect preservation.

For comparative study, a second series of experiments was performed. In this group, the ovaries were taken from donors that were



Fig. 6.

mature in contradistinction to those in the first series where the donors were immature, varying in age from three to twelve days. The hosts, as in the first group, were mature castrates.

(6) No. 21779. Ovarian homograft four weeks old. (Fig. 7.) The microscopic picture presents several graafian follicles in an early stage of cystic degeneration, in which the granulosa cells show pycnosis, and in many instances present an indistinct outline. The number of mitoses is distinctly diminished and many of the cells bordering upon the follicle cavity are completely degenerated and numerous others are already desquamated with the cavity proper. In these degenerated follicles, the ova have lost their regular outline and show beginning skeletonization. There is however seen in one place a normal fully developed graafian follicle and a corpus luteum.

(7) No. 21773. Ovarian homograft thirty-three days old. No healthy graafian



follicles are seen. Both the immature and the mature ones in this graft show definite and distinct degeneration. No mitoses were seen in the granulosa cells. The ovum has lost its regularity of outline and the interior shows a homogenous hyaline degeneration. Four corpora lutea of varying ages are seen.

(8) No. 21958. Ovarian homograft nine weeks old. Sections from this transplant show several corpora lutea, some immature graafian follicles and one almost mature one, which is, however, markedly degenerated.

(9) No. 22050. Ovarian homograft twelve weeks old. Here can be seen



Fig. 7.

numerous corpora lutea of different ages. The graafian follicles, with the exception of one, are markedly and decidedly degenerated.

(10) No. 22098. Ovarian homograft fourteen weeks old. The microscopic picture shows several mature graafian follicles. With the exception of the ovum, which shows very early degenerative changes, retraction of the cytoplasm and karyorrhexis of the nucleus, the rest of the follicles are apparently normal. Many corpora lutea are seen. Except for the very early ovular changes, this graft presents an almost normal ovarian picture.

(11) No. 22238. Ovarian homograft twenty-two weeks old. While most of the graafian follicles show cystic degeneration, several fully developed perfectly normal ones are seen. A number of corpora lutea are also to be seen.

(12) No. 22267. Ovarian homograft twenty-four weeks old. Shows definite degeneration and cystic changes in the graafian follicles. A third set of experiments was carried out, to act as a further means of comparison and control. In this series both auto- and homografts were made of mature ovaries in mature noncastrated rats.

(13) No. 20025. Ovarian homograft, seven weeks after implantation. There is very little ovarian tissue to be seen in the serial sections. Several mature graafian follicles present themselves. In these, the granulosa cells are apparently normal. The ova, however, show definite degeneration, the outline is no longer regular but is distinctly scalloped, the ovum proper shows marked skeletonization and the nucleus presents definite karyorrhexis.

(14) No. 20044. Ovarian homograft, eight weeks after implantation. Here too there is very little ovarian tissue left.

For still further comparison, a series of autografts in noncastrates was studied. In these animals one ovary was removed from its normal site and transplanted within a muscle pocket of the abdominal wall. The other ovary was not interfered with.

#### AUTOGRAFTS IN NONCASTRATES

No. 19954. Four weeks' old autograft. Several graafian follicles fully preserved. One mature graafian follicle seen—granulosa cells pycnotic. Many have lost their outline and are represented by darkly staining coarse granules. Follicular cavity contains many desquamated degenerate granulosa cells. Numbers absent. Several fairly large tubal cysts seen.

No. 19996. Seven weeks' autograft. Very little ovarian tissue is seen in the sections taken from this transplant. The stroma is well preserved and shows no evidence of degeneration. The parenchymatous tissue is markedly degenerated. The granulosa cells are pycnotic broken down into coarse granular bodies. The ovum present in one follicle has undergone hyaline degeneration. The follicular cavity contains many broken down granulosa cells.

No. 20075. Ten weeks' autograft. Same as No. 19996.

No. 20066. Eleven weeks' autograft. Shows healthy stroma tissue, cystic graafian follicle in which the granulosa cells are fully degenerated, showing pycnotic coarse granular degeneration. There are also seen a fibrotic corpus luteum and several tubal epithelial cysts.

No. 20938. Forty-five weeks' old autograft. One fibrotic corpus luteum is to be seen. There is also seen an almost mature graafian follicle, in which the granulosa cells are in perfect preservation. The ovum, however, has lost its regular outline and become irregularly scalloped. The body proper of the ovum has become skeletonized and the general center is missing. N. B. The unoperated ovary in this animal is markedly hypertrophied to easily twice the usual size.

In comparing the results of the transplants in the three groups described; the outstanding factor is the practically perfect preservation of the young immature ovaries that were employed as homografts.

It is interesting to note that Neuhof in discussing the relationship

between function and fate of transplants says, "The question is as yet in a very unsettled state. \* \* \* Halstead described persistent functional activity in autotransplants of parathyroids, when the remaining ones were removed and early disappearance of the transplants when the remaining ones were left in place. At the other extreme are those who believe that the rôle of function has no bearing on the fate of the transplant. As an example of this is the work of Gudet, who transplanted whole joints into the soft parts and found them to persist as such even when there was evidently no function to perform. \* \* \* Therefore it may be concluded that the response of the host to a transplant does not depend essentially on function."

It is not so much the intention of the writer to analyze the investigation of Gudet and others, as it is to present evidence that has a specific bearing upon this question. The fact that homografts in castrates show a far greater degree of preservation than do similar homografts in noncastrates can be explained most readily, and in the opinion of the writer most rationally, on the ground of functional demand. The more favorable state of preservation of the homografts in the noncastrates, in comparison with those of the autografts surely cannot be explained on any other ground especially when one takes into consideration the fact that biologically everything is in favor of the autograft.

As for the value of growth potentiality, the state of preservation and of development of the grafts in the first series,—young, immature organs,—speaks obviously and irrefutably for the fact that successful outcome of tissue or organ transplant varies directly with the property of growth potentiality.

The writer, in conclusion, offers the following suggestion as a clinical application of this animal experimental work: Wherever there is an indication for ovarian grafting, as in congenital absence or hypoplasia of the internal genitalia, bilateral castration in young women, etc., better results might be obtained by using healthy, young, immature ovaries.

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20 WEST FIFTIETH STREET.

(For discussion, see p. 715.)

## END-RESULTS WITH THE EMMET-BALDWIN OPERATION FOR PROCIDENTIA\*

BY GORDON GIBSON, M.D., BROOKLYN, N. Y.

IN 1894, the late Dr. L. Grant Baldwin, of Brooklyn, modified and perfected the Sims-Emmet operation for procidentia. He obtained astonishing results with this procedure, which those of us who were fortunate enough to be associated with him called the Baldwin operation.

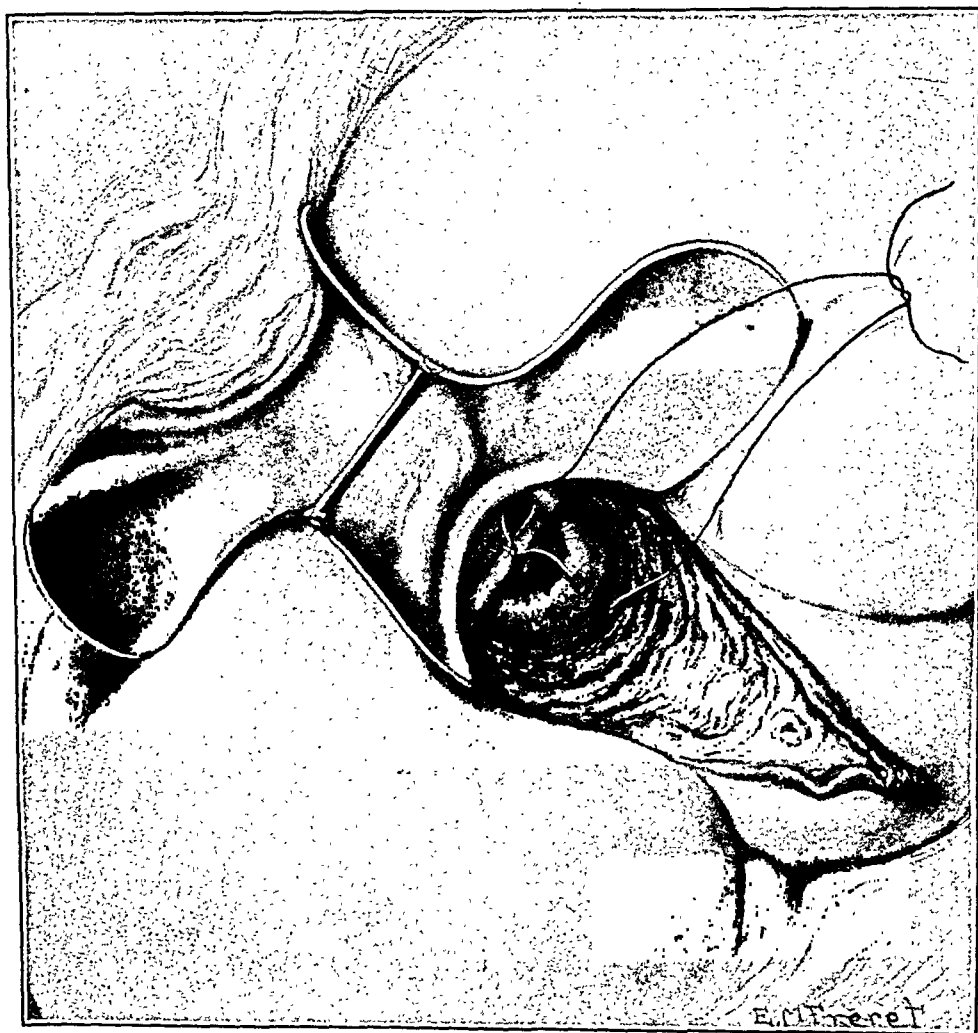


Fig. 1.

I think it is generally accepted that the uterus is held in its position in the pelvis by the pelvic fascia, and that procidentia is the result of a lesion of this fascia. Whether this lesion is a separation of, a

\*Read at a meeting of the New York Obstetrical Society, February 10, 1925.

stretching, or a rupture of the fibers makes very little difference—the result is the same, a descent of the uterus. This descent is associated, in the majority of cases, with a cystocele which in itself is due to a lesion of that part of the pelvic fascia known as the vesicovaginal fascia, and with a rectocele which is the result of a separation of the levators from the anterior and lateral walls of the rectum, and a lesion of the rectovaginal fascia, a derivative of the pelvic fascia.

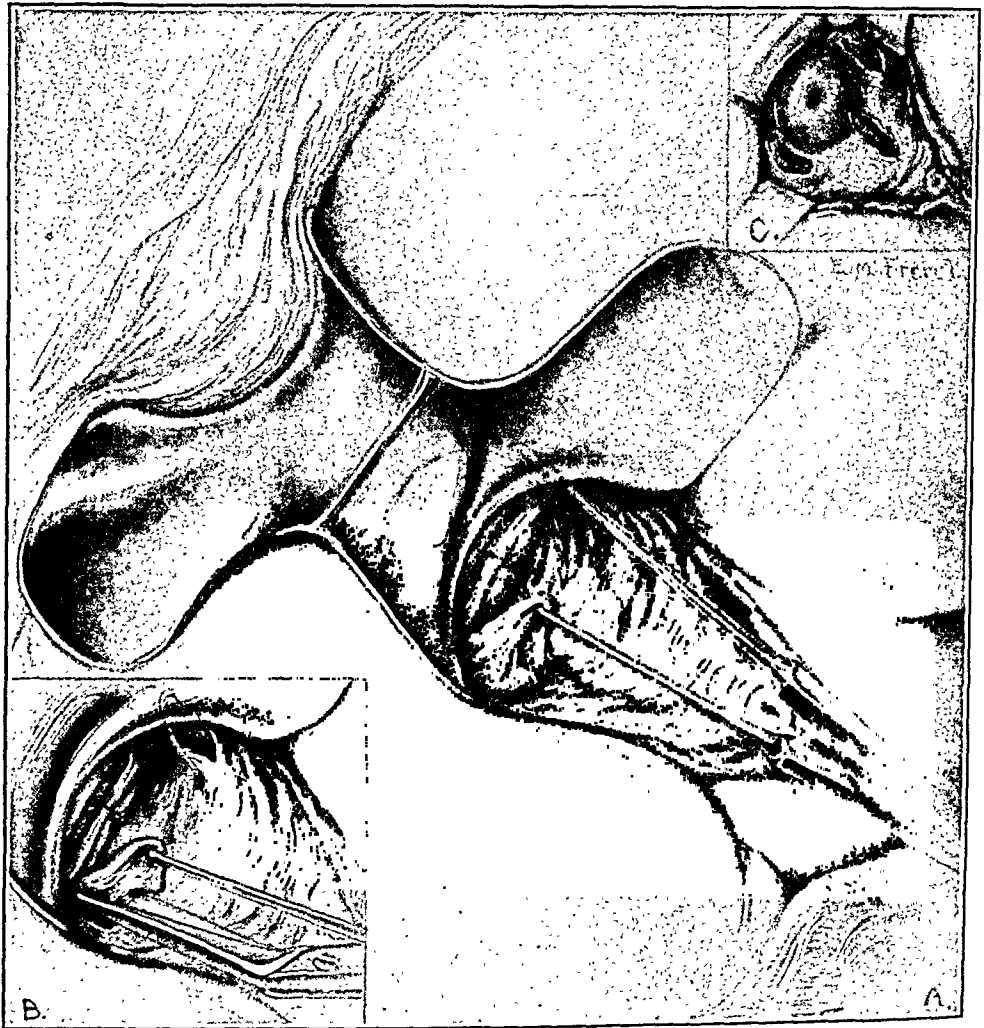


Fig. 2.

Assuming the above to be correct, the obvious method for the cure of procidentia would be to "take up the slack," so to speak, of the pelvic fascia. This is done in the Baldwin operation by bringing the lateral expansions of the pelvic fascia in front of the cervix and attaching them together and to the anterior surface of the cervix.

The operation is done with the patient in the Sims position because with this position the anterior vaginal wall spreads itself out and the cervix falls into the hollow of the sacrum where it is to be maintained. A Cleveland self-retaining speculum is introduced with a strand of

catgut, with long ends tied into the fenestrum in the end of the vaginal blade. Generally, the cervix is large and hyperplastic and is amputated. The stump of the cervix is now sutured to the end of the vaginal blade of the speculum, using the strand of gut previously tied in the fenestrum (Fig. 1). This holds the cervix well back in the position it will have when the operation is completed. A deep sulcus is now apparent on each side of the cervix. Two points are selected, one

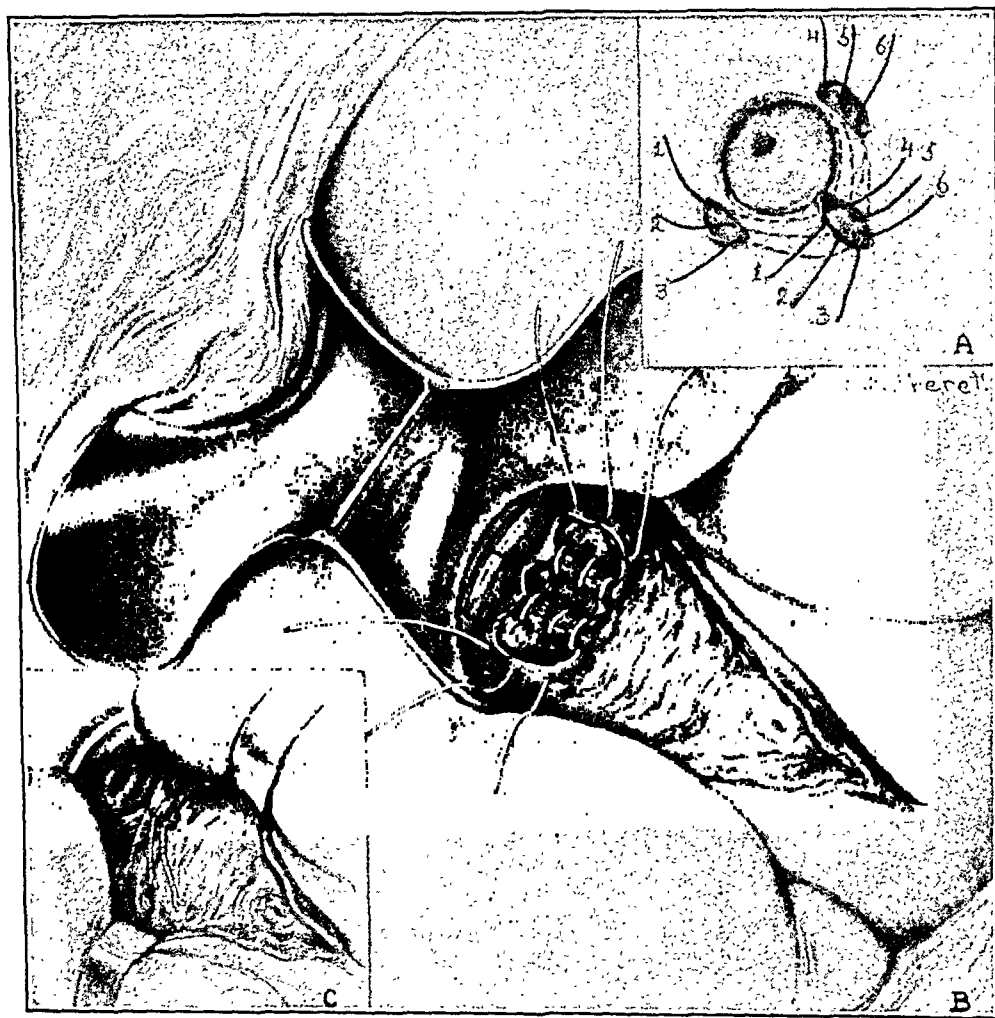


Fig. 3.

in the bottom of each sulcus a little posterior to the cervix, which when drawn down by tenacula, will meet in front of the cervix without undue tension. An area three-quarters by one-half inch is now denuded by one fairly deep bite of the scissors, exposing the edge of the pelvic fascia. A third area of the same size is denuded in front of the cervix (Fig. 2). The internal edges of the lateral denudations are now sutured to the opposing edges of the central area, leaving practically one broad denuded area just in front of the cervix (Fig. 3-A). The intervening areas which were not denuded fold over, forming two

little tunnels. The denuded area is then underlaid with two No. 26 silver wire sutures, taking three bites with each suture, first, under the right denuded area, catching the exposed edge of the pelvic fascia, second, a bite into the anterior surface of the cervix, and, third, under the left denuded area, again catching the exposed edge of the pelvic fascia (Fig. 3-B). These, when twisted, bring the edges of the pelvic fascia together and attach them to the anterior surface of the cervix. In other words, a bridge of fascia is built up in front of the cervix

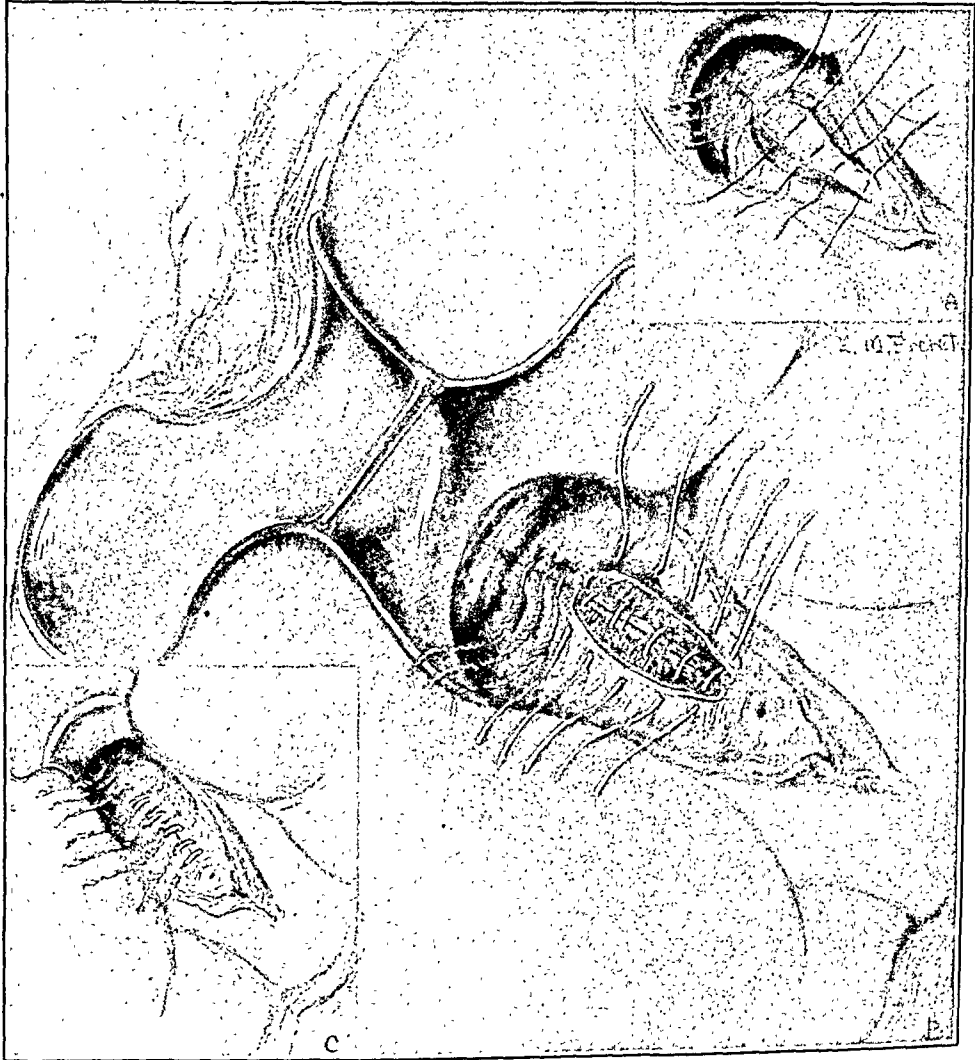


Fig. 4.

(Fig. 3-C). The success of the operation depends on the tension of this bridge. If there is too much tension, the sutures will cut out, and if too little, the uterus has too much play and will gradually force itself down again. It is only after repeated trials with the idea of tension in mind, that one is able to determine the proper places for the lateral denudations, and upon these areas the success of the operation depends.

The cystocele is then treated by making two narrow denudations

from the bridge down almost to the meatus, suturing the internal edges, leaving a broad denuded area with an inturned tunnel of vaginal mucosa. The external edges are then brought together with three or four silver wire sutures (Fig. 4).

The stitch holding the cervix to the tip of the vaginal blade of the speculum is now cut and the speculum removed. The patient is placed in the lithotomy position and the rectocele dealt with in whatever manner the operator chooses. The method which has given us the best results is the high Hegar denudation with suture of the separated levators up to the level of the cervix and suture of the separated transversus perinei to form a new perineal body. The sutures are removed in from four to six weeks.

Since January, 1919, we have done this operation on 89 patients. One patient died a few days after operation from cerebral embolism. One developed a ureterovaginal fistula which, strange to say, was cured by passing a catheter into the ureter, using a Kelly cystoscope. There were two immediate failures which required secondary operation. Forty-five of these patients have been found by follow-up letters and 15 of these have been examined recently. Of these 45 patients, 43 are cured and two are not. One of these failures is only partial, there being a return of the cystocele.

The great advantage of this operation is that the anatomic relationship of the structures involved is not disturbed as in many of the other operations employed for the relief of this condition.

I wish to thank Dr. J. F. Todd for the privilege of operating on the cases of his service while I was associated with him at St. Peter's Hospital, Dr. John O. Polak for the privilege of doing this operation in his clinic, and Drs. W. F. Egan, of St. Peter's Hospital, and M. V. Armstrong, of the Long Island College Hospital, for the follow-up work.



## SUGGESTED BIOPHYSICAL INTERPRETATION OF CANCER\*

BY GEORGE W. CRILE, M.D., CLEVELAND, OHIO

*(From the Cleveland Clinic, Cleveland, Ohio.)*

IN recent papers<sup>1</sup> I have presented the conception that living processes, whether normal or pathologic, are primarily caused by alterations in the electric potential of (a) the unit cells of the organism and (b) the organism as a whole, and variations in electric potential are dependent upon points of highest and lowest potential—positive and negative poles. This conception of living processes has been called the “Bipolar Theory.”

In accordance with this conception, one would suppose that if part of the cells of any tissue show an abnormal activity as compared with the other cells of the same tissue, one should make a comparative study of the normal and the abnormal cells to see if one could discover any differences in structure which would produce differences in the electric potential of the abnormal as compared with the normal cells.

Let us first examine the structure of the typical unit cell of the organism as a bipolar unit. It is composed of two major parts of different degrees of acidity, separated from each other by a semipermeable lipid membrane. This membrane, as has been demonstrated by Dr. Hugo Fricke in the Biophysical Laboratory of the Cleveland Clinic, is  $\frac{4}{10,000,000}$  cm. thick. A lipid membrane of such exceeding thinness is a dielectric with electric capacity of a very high order. As estimated by Dr. Fricke, the electric capacity of the lipid films of the blood corpuscles is 0.8 m.m.f. per sq. cm. In addition to these two major portions of the cell, both the cytoplasm and the nucleus contain multitudes of tiny spherules, each of which in turn is surrounded by a lipid envelope of almost infinite fineness. We may suppose that the contents of these spherules in turn have a different reaction from that of the surrounding medium.

By virtue of these lipid films, the greater the lipid film surface, the greater the oxidative capacity of the cells; the greater the oxidative capacity, the greater the production of positive and negative ions; the greater the production of positive and negative ions, the greater the charges accumulated on the lipid film which separates the nucleus from the cytoplasm. In a given cell, the greater the electric capacity the greater in turn will be the capacity to do work—the greater its capacity to grow. In the unit cell we assume that the ions accumulated upon the interior of the lipid membrane of the

\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

nucleus from the more acid contents of the nucleus are positive, and attract to the opposite side of the film the negative ions from the less acid cytoplasm. It is this difference in reaction between the nucleus and the cytoplasm which makes the unit cell a bipolar unit.

It would follow that the greater the size of the nucleus in comparison to the size of the cell body, the greater would be the difference of potential between the positive charges within and the negative charges without. When this difference in potential has reached a certain point, one would suppose that the excess energy would be expressed in mitosis and division, first of the nucleus and then of the cell. This is what is known to happen in the process of fertilization. The head of the spermatozoon, which is principally composed of nuclear material, when added to the nucleus of the ovum, hugely increases the nucleus plasma ratio with increased accumulation of positive and negative charges on the lipoid film surrounding the nucleus, with in turn an increased potential of the cell which finally is transformed into an increased activity of the nucleus and later of the cell as a whole, as expressed in mitosis and cell division.

The high nucleus plasma ratio of the cancer cells as compared with normal cells has been recognized by many investigators although it is disputed by some. In many cases the potential of the cancer cells is enhanced still further by multiple nuclei which we may suppose would have the same or a similar effect upon the electric capacity of the cells with that produced by the addition of the spermatozoon to the nucleus. If this conception is correct, it would follow that the normal cells to their smaller nucleus plasma ratio, hence smaller lipoid film area, hence smaller capacity, hence lower potential, would not be able to compete with the cells with the increased nucleus plasma ratio and the latter cells would therefore encroach upon and crowd out the cells with smaller capacity.

If this conception is correct, then it should bear the test of biophysical measurements which should show that the capacity of cancer cells is higher than that of normal cells. To test this point, in the Biophysical Laboratory of the Cleveland Clinic, Dr. Hugo Fricke has devised an apparatus whereby the capacity of cells and animal tissues can be measured to a high degree of accuracy and by means of this apparatus, tissues from over 100 cases of cancer have been measured by Dr. Fricke and his collaborator, Dr. Sterne Morse. They have found that the capacity of malignant tumors has been uniformly far in excess of that of benign tumors or of normal tissue. They have found, moreover, and this finding appears most significant, that malignant tumors, after radiation, have a very low order of capacity.

Our first biophysical measurements, antedating those just described, were measurements of the electric conductivity of normal and of malignant tissues. In those studies the electric conductivity of 338 sections

of malignant tissues was measured and uniformly was found to be many times higher than that of the adjacent normal tissues. Moreover, the conductivity of the actively growing portions of a cancerous growth was found to be much higher than that of the degenerating portions. Both the electric conductivity measurements, therefore, and the capacity measurements are consistent with the bipolar theory.

Whether or not we are correct in our interpretation of these biophysical measurements, the uniformity of our findings to the present time would appear to indicate that capacity measurements of suspicious tissues may provide an additional and exceedingly accurate criterion for the pathologist. The histologic picture presents a static picture. The capacity measurement gives, in the exact figures of the physicist, the dynamic status of the cell and it is with the dynamic status of the cell that we are primarily concerned in the interpretation of the status of a suspected malignancy.

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(For discussion, see p. 711.)

### THE TREATMENT OF INOPERABLE CERVICAL CARCINOMATA WITH MEASURED DOSES OF X-RAYS AND RADIUM BASED ON MICROSCOPIC EXAMINATIONS. THE FIVE YEAR END-RESULTS\*

By HENRY SCHMITZ, M.D., LL.D., F.A.C.S., CHICAGO, ILLINOIS

THE treatment with radium and x-rays of borderline and inoperable carcinomata of the uterine cervix is a recognized procedure. The cancer becomes controllable and in many instances five year periods have been recorded free from all signs of the disease. The efficacy of radiation therapy in this disease depends on the radiation dose, the homogeneous distribution of the dose throughout the true pelvis, the cellular and structural type of the growth and the systemic reaction due to the activation of the defensive forces of the host. The curative value must be based on the five year end-results.

*The radiation dose* is the product of the quality or intensity of the rays and the time of application. The standard or unit of the dose is determined by the reaction of the normal skin to a known quantity

\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

and quality of rays. A full skin dose has been applied if an intense reddening of the epidermis occurs within fourteen to twenty-one days after the radiation and a deep brown tanning after four to eight weeks. The skin erythema should be so intense that an increase of 10 per cent in the time duration will produce a second degree burn of the skin, evidenced by blistering and subsequent loss of the superficial layers of the epidermis. The full erythema skin dose has been designated a 100 per cent E. S. D., and is the standard of the radiation dose.

The output of an x-ray tube operated with known factors as kilovoltage, milliamperes, filters, focus skin distance, type of tube and size of field, can be measured with standardized instruments. The factors also determine the quality of the radiation. Therefore the same dose or a fraction thereof can always be applied if we observe the same factors of operation. The measuring instruments most frequently used are the Duane electrometer, the Fürstenau intensimeter, the Friedrich iontoquantimeter, and so forth.

The radiation intensity of a capsule of radium is practically constant. If the same factors in the application are observed, namely, the milligrams of radium element content, the geometrical size of the capsule, the time of application and the distance maintained between the capsule and the object to be rayed in air or water, the 100 per cent E.S.D. may be determined. This dose is constant and does not have to be remeasured if the same factors are maintained.

*The homogeneous distribution of the rays within the true pelvis.*—The true pelvic cavity represents the extent of a cervical carcinoma that may be successfully radiated. If the growth has invaded the lumbar lymphnodes it is impossible to control its further progress with radiation treatment. The cavity is limited laterally by the bony pelvic girdle, superiorly by a plane drawn through the linea terminalis and inferiorly by the pelvic diaphragm. The bony girdle has a diameter of about 12 cm. and the height from the sacral promontory to the pelvic diaphragm is about 10 cm. The object of radiation therapy must be to distribute a measured dose of rays homogeneously through the true pelvic cavity, which is lethal for carcinoma cells.

The intensities of radium and x-rays decrease in an inverse ratio with distance and by absorption. However, the scattering of the primary rays causes an increase in the intensity. The latter is the greater, the deeper the rays advance in the body. It became imperative to investigate the actual distribution of the intensity of rays in a water phantom. It was made for two radium capsules of 25 mg. element each by Huth and the writer according to the method of Glasser in Friedrich's laboratory. From these measurements equal intensity

curves were constructed. (Fig. 1.\*) These enabled us to determine the time duration of application of the radium capsules for the production of the 100 per cent E.S.D., for each one of the equal intensity curves. (Table I.)

TABLE I

EQUAL INTENSITY CURVE	MG. EL. HRS. FOR 100% E.S.D.	MEDIAN TRANSVERSE DIAMETER	MEDIAN LONGITUDINAL DIAMETER
60	1600	3.0 cm.	5.5 cm.
40	2400	4.5 "	6.3 "
30	3200	6.0 "	7.0 "
20	4800	7.0 "	8.0 "
10	9600	9.5 "	10.7 "
5	19200	13.8 "	13.9 "

The object of radiation therapy in cervical carcinomata must be to kill the malignant cells without causing irreparable injury to the normal tissues and organs within the radiation field. The posterior bladder wall is about 2.5 cm. distant from the cervical canal when the

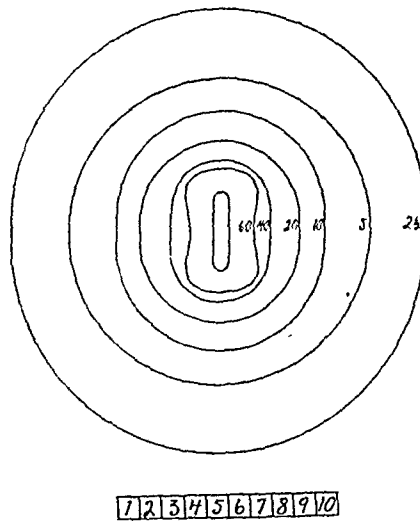


Fig. 1.—The equal intensity curves of 50 mg. radium element measured in water.

bladder is empty; and the anterior rectal wall is about 2.5 to 3 cm. distant from the cervical canal when the bowels are empty. If the organs are filled they are pressed closer to the cervix. This should be avoided. The radium capsules are always placed in the cervical canal. Hence the posterior bladder wall and the anterior rectal wall lie within the range of equal intensity curve 30 if the organs are kept empty. This can be achieved by placing a retention catheter in the bladder, using enemas and liquid diet and distending the vaginal canal with gauze. Normal tissue will bear without permanent injury a radiation dose of 150 to 175 per cent E.S.D. The 100 per cent E.S.D. is attained at equal intensity curve 30 with 3200 mg.el.hrs. of radium; the

\*Figs. 1, 3, 4, 5, 6, 7, 8 and 9 are taken from the author's chapter in Gellhorn: *Medical Gynecology*.

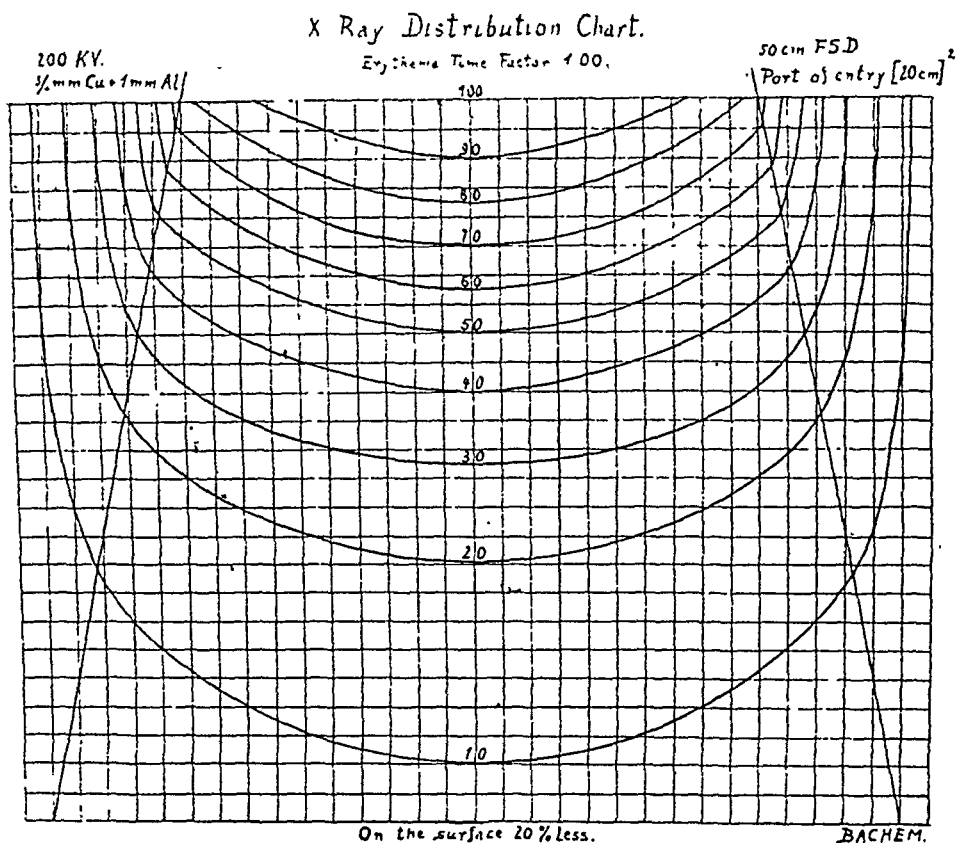


Fig. 2.—Equal intensity curves of x-rays measured in water. The factors are 200 KV., 0.75 mm. copper plus 1.0 mm. aluminum filter, 50 cm. focus skin distance and 20 x 20 cm. size of field. Time to produce a 100 per cent skin erythema is 100 minutes using 5 milliamperes.

150 per cent E.S.D. with 4800 mg.el.hrs., and the 175 per cent E.S.D. with 5600 mg.el.hrs. This dose represents the utmost limit of the radium dose if we wish to avoid necrosis of bladder and rectum. At the periphery of the pelvis the dose is then 30 per cent with 175 per

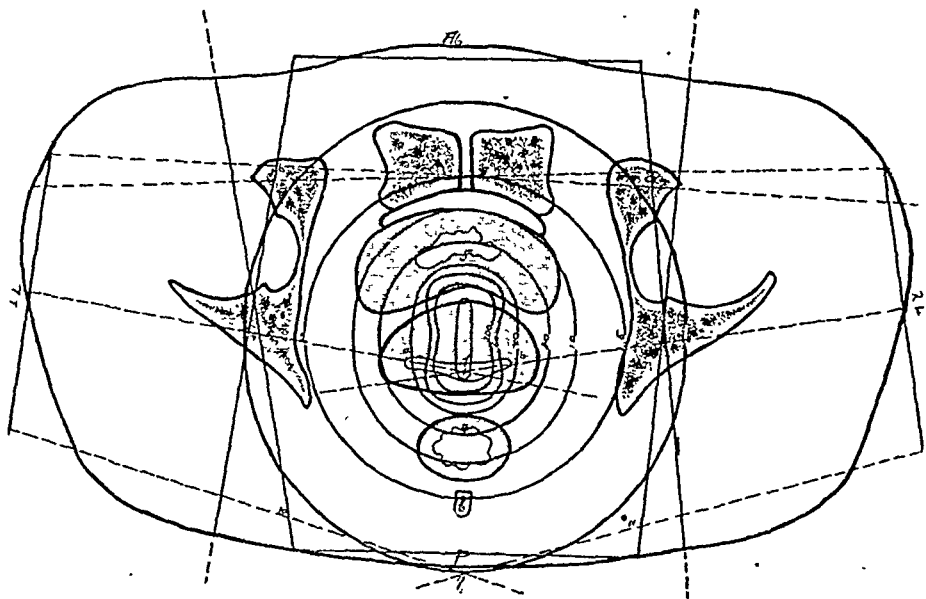


Fig. 3.—The calculation of the combined radium and x-ray intensities.

cent at equal intensity curve 30, and 25 per cent with 150 per cent at equal intensity curve 30. In other words up to isodose 30 the dose should arrest the growth, beyond 20 it will stimulate the growth of the cancer. We may conclude that radium therapy enables us to effectually destroy a cervical carcinoma that is confined within the region of equal intensity curve 20, which has a transverse diameter of 7 cm. and a longitudinal diameter of 8 cm. *if our 100 per cent E.S.D. is the lethal carcinoma dose.*

The distribution within the body of the intensities of x-rays produced with known factors has been studied by Dessauer, Glasser, Bachem, Erskine and others. Fig. 2 shows a chart constructed by Bachem most frequently used in short wave x-ray therapy. It gives the equal intensity curves in per cent of the 100 per cent skin dose.

If we assume that the average dimensions of a female body in the pelvic region are 22 cm. in the anteroposterior diameter through the cervix and 38 cm. in the transverse diameter and that the cervix usually lies at a depth of two-thirds of the anteroposterior diameter from the anterior abdominal wall, that is 14 cm., and use four x-ray beams, marked A., P., L.L. and R.L. in Fig. 3, then the distribution of the combined x-ray intensities at points 1 to 11 is as follows:

TABLE II

X-ray Beam	1	2	3	4	5	6	7	8	9	10	11
Anterior	31	31	31	26	50	100	15	59	59	12	12
Posterior	50	42	42	62	32	15	100	23	23	89	89
Left Lateral	19	36	11	17	19	0	14	39	10	30	10
Right Lateral	19	11	36	21	19	0	14	10	39	10	33
Sum	119	120	120	126	120	115	143	131	131	141	144

We may conclude that x-ray therapy permits a practically homogeneous distribution of the dose throughout the pelvis. X-rays alone would suffice to kill a cervical cancer *if the lethal carcinoma dose is our 100 per cent E.S.D.*

TABLE III

GROUPING OF 450 CASES OF CERVICAL CARCINOMATA ACCORDING TO YEARS AND PHYSICAL FINDINGS

Year	A. PRIMARY					B. RECURRENT					Summary
	Group I	Group II	Group III	Group IV	Total	Group I	Group II	Group III	Group IV	Total	
1914	1	1	14	3	19	1		3	4	8	27
1915		4	10	5	19		2	6	2	10	29
1916	1	2	8	5	16	2		6	3	11	27
1917		4	10	4	18	1	1	3	2	7	25
1918	1	4	17	9	31		1	6	5	12	43
1919	2	3	12	14	31			10	4	14	45
1920	2	3	19	18	42	5	2	3	3	13	55
1921	4	5	13	21	43		1	2	5	8	51
1922	1	5	38	20	64	2	2	2	6	12	76
1923	3	14	32	14	63	2	2	3	2	9	72
Total	15	45	173	113	346	13	11	44	36	104	450

TABLE IV  
FIVE YEAR END-RESULTS IN CERVICAL CARCINOMATA  
A. PRIMARY CARCINOMATA

Year	Group I			Group II			Group III			Group IV			Total		
	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent
1914	1	1		1	0		14	0		3	0		19	1	5.3
1915				4	3		10	0		5	0		19	3	15.7
1916	1	1		2	0		8	2		5	0		16	3	18.7
1917				4	2		10	2		4	0		18	4	22.1
1918	1	1		4	1		18	2		8	0		31	4	12.9
Total	3	3	100	15	6	40.0	60	6	10.0	25	0		103	15	14.5

## B. RECURRENT CARCINOMATA

Year	Group I			Group II			Group III			Group IV			Total		
	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent	No.	Living	Per cent
1914	1	0					3	0		4	0		8	0	
1915	2	0		2	0		6	0		2	0		10	0	
1916							6	0		3	0		11	0	
1917	1	0		1	0		3	1		2	0		7	1	
1918				1	0		6	1		5	0		12	1	
Total	4	0		4	0		24	2		16	0		48	2	4.2



If we use radium without x-rays in cervical carcinomata, we are at a disadvantage due to the rapid decrease of the intensity and, therefore, inhomogeneous distribution of the rays. The regional lymph-nodes cannot be effectually destroyed. If we employ x-rays without radium then we are limited by the tolerance of the skin to a low dose though a homogeneous distribution of the rays throughout the pelvis is attained. However, if we use a combination of radium and x-rays then we can obtain a homogeneous distribution of a radiation-intensity throughout the pelvis of 150 to 175 per cent E.S.D. beyond the equal intensity curve 20. The combined x-ray and radium dosage is determined by reducing or increasing the number of x-ray fields or by varying the time duration of the radium application. Within the

TABLE V

PERCENTAGES OF OPERABILITY, AND RELATIVE AND ABSOLUTE CURABILITY OF CERVICAL CARCINOMATA FOR DIFFERENT METHODS OF TREATMENT

Clinic	Operability Per Cent	Total Number	Total Number	Relative Cures	Absolute Cures	Method of Treatment
Clark, T. G.	17	140	12	27.2	8.6	Radium
Bailey & Healy	22	155	17	26.4	9.2	Radium
Kehrer	45.7	129	36	40.7	27.8	Radium
Doederlein	32.6	755	103	30.3	13.2	Radium and X-rays
Baisch	51.0	198	28	23.8	14.1	Radium and X-rays
Schmitz	17.5	103	15	50.0	14.6	Radium and X-rays
Johns Hopkins	52.1	387	102	46.5	26.6	Surgery
Stoeckel	70.6	350	98	35.4	26.6	Surgery
Graves	64.0	181	34	34.2	18.5	Surgery

equal intensity curve 30 the dose is destructive. However a destruction of the uterus is not objectionable. I must refrain from a more detailed description of the technic. Those interested may find it in Gellhorn's "Non-Operative Treatment in Gynecology," page 370.

*The radiation sensitiveness of cervical carcinomata* depends on the cellular structure and not the type of growth. The nomenclature applied to cervical cancers differs greatly in the literature. A uniformity would be very desirable. We have adopted the classification of Schottlaender and Kermauner,—so have Alter, Martzloff and others.

The cervical carcinomata are composed of either basal cells, squamous epithelial cells or cylindrical epithelial cells. The basal cells are embryonal, unripe spindle-shaped cells arranged in alveoli. They have not as yet acquired the riper and maturer forms of the squamous and cylindrical epithelial cells. The latter have usually an adenomatous arrangement. We found in our series 60 per cent squamous, 15 per cent basal celled, and 25 per cent adenomatous. Transitional and mixed forms composed of basal and squamous or cylindrical cells

are also found. They are included in the squamous cell growths and amounted to 12 per cent.

Carcinomata may be of soft consistence when they are of a medullary type. Such a cellular growth is a very acute lesion. The new growth may be of a medium consistence when cells and stroma are present in an even amount. This type has been termed carcinoma simplex. The cancer may be of hard consistence, when the connective tissue frame-work predominates. It is termed a scirrhus cancer. A tumor which shows fibrous reaction is more chronic in its course. Schottlaender and Kermauner found in 140 cervical carcinomata 115 primary solid cancers, and 73 were medullary, 12 simplex, and 30 scirrhus type. The adenomatous cancers numbered 25.

The manner of growth may be either proliferative, everting, exophytic or infiltrative, inverting, endophytic. Exo-endophytic growths, also, occur. The same authors found in the solid carcinomata 5 per cent exophytic, 24 per cent exo-endophytic and 71 per cent endophytic, and in the adenomatous carcinomata 17 per cent exophytic, 46 per cent exo-endophytic and 37 per cent endophytic. There is no connection between the type of cell and the manner of growth.

Clinically, the basal-celled, medullary and infiltrating tumor is the most malignant.

The law of the radiation sensitiveness of tissues of Bergonié and Tribondeau reads: "Immature cells and cells in an active state of division are more sensitive to rays than are cells which have already acquired their fixed adult morphologic and physiologic characters." Ewing states: "It thus appears that the pathological processes in the two classes of tumors—embryonal and adult—are essentially different. This fact was hardly appreciated until it was revealed as a formidable obstacle to radiation therapy. A tissue invaded by an embryonal or lymphoid tumor may be restored to a normal state without appreciable scarring, but when the tissue is invaded by a squamous or alveolar carcinoma that tissue is condemned to extensive scarring or complete destruction." Lahm, Alter and the writer have expressed similar views. The type of growth whether medullary, simplex or scirrhus does not seem to influence the radiation sensitiveness of the cancer cells.

Can the difference in radiation sensitiveness between the unripe and riper epithelial cell cancers be stated in per cent of the E.S.D.? If so, would it be practical to calculate the dose from the microscopic findings?

The application of a lethal carcinoma dose should be followed by negative palpatory and microscopic findings. The cervix should be healed, the parametria be free of indurations, the pelvic organs become movable and of normal consistency, though scar formation may leave cicatricial bands in the parametria. The microscopic examina-



Fig. 4.—Unripe basal-celled carcinoma of the uterine cervix before radiation treatment.

tion of excised tissue from the healed cervix must reveal a complete absence of epithelial cancer cells. The normal palpatory findings and the absence of malignant cells in the tissues, therefore, are the criteria upon which we must base the therapeutic efficacy of radiations in malignant disease. Should local healing continue for five years free of any recurrence, then the cure is an anatomic one and should be designated complete.

We have kept exact records of all the cases of cervical carcinomata

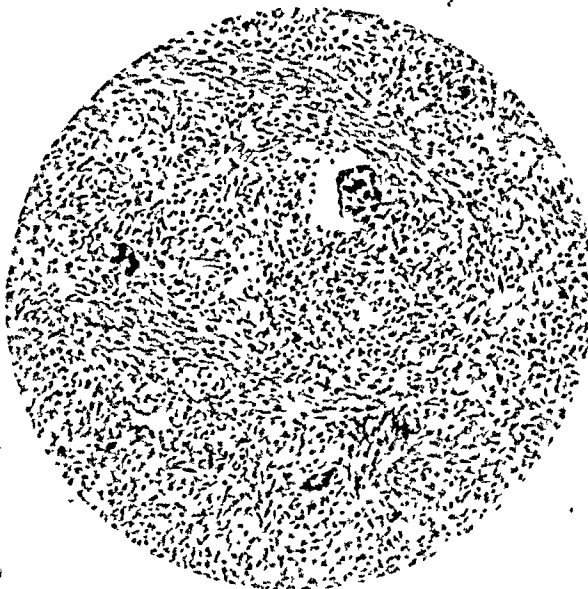


Fig. 5.—The histologic changes caused within three weeks in the basal-celled cancer seen in Fig. 4, with a combined 100 per cent E.S.D. of radium and x-rays.



Fig. 6.—Adenocarcinoma of the uterine cervix before radiation treatment.

entering our clinic. We made microscopic sections of the cervical tissues before the application of the rays and weekly after the treatment; we recorded the physical bimanual findings and the cystoscopic and proctoscopic examinations at every re-examination and maintained a follow-up system. The microscopic re-examinations were carried out in more than one hundred cases. It would require too much space

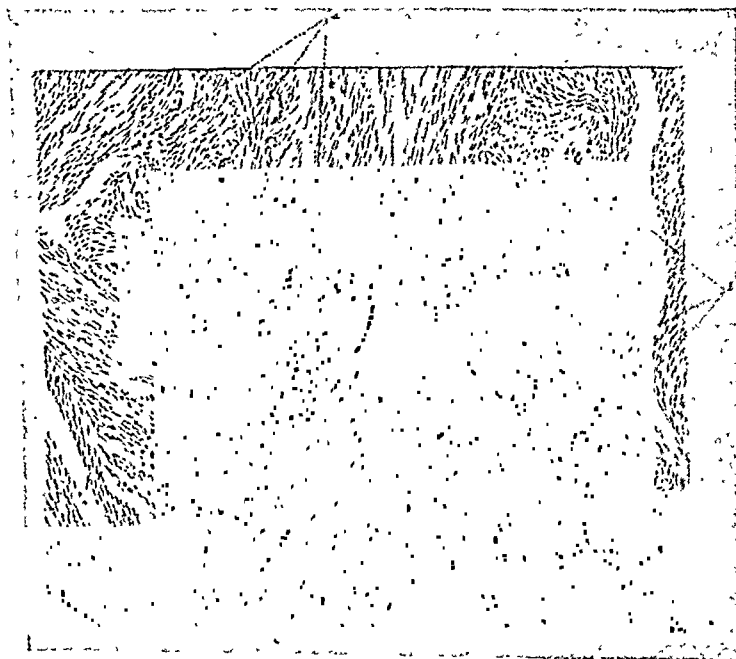


Fig. 7.—Microscopic section from the same cervix after radiation treatment. The uterus was removed ten days after a combined radium and x-ray treatment of about 150 per cent E.S.D. Note the marked fibroblastic and leucocytic infiltration and almost complete disappearance of the carcinoma cells.

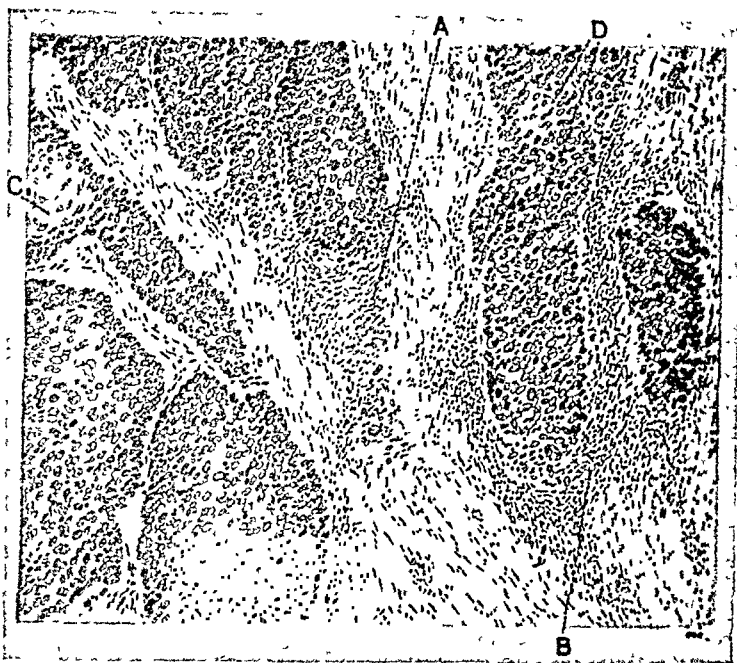


Fig. 8.—Squamous epithelial cell cancer of an endophytic growth of the uterine cervix before radiation treatment.

to recite the details of dosage and comparisons with the microscopic and physical findings.

The basal cell carcinomata of the cervix responded rapidly to a 100 per cent E.S.D. with local healing and negative microscopic findings. (Figs. 4 and 5.) The adenocarcinomata and squamous epithelial cell cancers required a 150 to 175 per cent E.S.D. to assure local healing and negative microscopic findings. (Figs. 6, 7, 8 and 9.) The 175 per cent E.S.D. causes scarring of the uterus and second degree



Fig. 9.—The same uterus was removed three months after the application of about 175 per cent E.S.D. of radium and x-rays. Note the connective tissue formation and the absence of malignant cells.

burns of the normal epithelium. The normal tissues within the radiation area invariably recover from the damage. This may be best studied by repeated endoscopic examinations of rectum and bladder. Superficial ulcerations caused in these organs by the course of massive rays heal gradually, and disappear within six to eight weeks subsequent to the treatment. Should healing of the cancer not ensue it is not advisable to re-treat the patient. We have never seen any benefit from such re-treatment. Contrary the tissues will not recover from the added damage. They become indurated and break down. Such radiation induration and ulcers form very slowly and rarely appear and cause symptoms before the expiration of a year or more. Contractions of the bladder and strictures of the rectum and bowels, ureteral stenoses with hydronephroses are some of the end-results. Therefore, if our measured massive dose of rays does not result in a control of the cancer, we advise against a repetition of the treatment.

Is the calculation of the combined radium and x-ray dose based on the microscopic findings practicable? Fifteen per cent of microscopic examinations have shown an unripe basal cell cancer. In view of the fact that a 175 per cent E.S.D. distributed homogeneously throughout the pelvis is almost always followed by severe local reactions, we deem it necessary to administer the dosage which will ensure control of the cancer. Therefore we apply a measured 100 per cent E.S.D. in basal-celled cancers and 150 to 175 per cent in the ripper-celled carcinomata.

*The Systemic Reaction.*—The statement has been made in the preceding paragraph that control or healing of the cancer does not always follow the application of a measured combined radium and x-ray dose. In the literature the same observation is frequently quoted. How may we explain such a refractory behavior?

Cellular destruction follows exposure to x-rays and radium. The split proteins give rise to an acute intoxication. Numerous observations point to the increased protein metabolism as shown by the increased amount of protein derivatives in the urine. Hall and Whipple observed in dogs, after massive doses of roentgen rays, that the non-protein nitrogen of the blood was markedly increased a short time before death. The urinary nitrogen also increased and remained high until the death of the animals. These authors conclude that the roentgen ray intoxication or general constitutional reaction is a good example of a "nonspecific" intoxication. Hirsch and Peterson could not demonstrate a striking or consistent alteration in the urea nitrogen, total nonprotein nitrogen, uric acid and creatinin in blood of carcinoma patients treated with roentgen rays. Cori and Pucher found an increase in the total nitrogen in all cases in the 'postradiation periods. It is very probable that a great part of this increase of total nitrogen was due to elimination of destroyed cells. They state that roentgen sickness is not due to excessive cell catabolism.

At the 1923 meeting of this Association I reported the chemical blood analyses of thirty-five cases of carcinomata subjected to chemical blood analysis. The cases which were successfully radiated all showed an increase in the nonprotein nitrogen constituents.

It seems probable that the systemic reaction or the radiation sickness is due to an absorption into the circulation of protein liberated by the destruction of cells. It is more marked in persons in a toxic condition from autolytic processes taking place in the cancer. Such patients are already embarrassed in dealing with an intoxication and, if to this strain is added the metabolic labor of dealing with the complete decomposition of a large amount of broken-down tissue products, the metabolism may collapse, and in consequence signs of severe intoxication appear.

The intoxication is characterized by the symptom complex seen during the negative phase of any nonspecific protein toxicosis. It causes an activation of the defensive forces of the host and thereby aids in the arrest or complete reabsorption of the growth. Should the negative phase, however, persist, because the host cannot any more activate the defensive forces, then the growth will not heal and the patient, also, will show a continued progress in the constitutional manifestation of the disease.

The intoxication should be treated symptomatically. Elimination of the toxic proteins may be stimulated by diuresis and catharsis. Plenty of fluids should be given. Castor oil is the preferred cathartic. Rest in bed, hydrotherapy for hyperpyrexia, nourishing liquid food by mouth or rectum are necessary. Acidosis requires alkalization with solutions of sodium bicarbonate or hypodermoclysis with normal saline and glucose solutions. Alkalinoses may be treated with mild acids, as orange and lemon juices. The nausea and vomiting may be controlled with hypodermic injections of atropine or large doses of bismuth subnitrate. The latter also counteracts the profuse diarrhea.

Should the symptoms become alarming then hypodermoclysis of normal saline solutions is indicated. Extreme cases require transfusions of whole blood.

A persistence of the toxemia and a concomitant rapid loss of weight and strength also demand transfusions of whole blood. The intravenous injections of colloidal metals and foreign proteins are beneficial. They are followed by rigor, pyrexia and leucocytosis, that is, a non-specific reaction. We observed that patients with a persistent toxicosis and lack of evidence of local healing improved after repeated injections of colloidal metals or proteins. The blood count returned to normal, local healing ensued, and weight and strength returned. "Radiation cachexia" is probably a radiation intoxication with a persistent and chronic course.

## THE END-RESULTS

From January 1, 1914, to December 31, 1923, four hundred and fifty cases entered our clinic: 345 of the patients had primary carcinomata and 105 had a recurrence following surgical procedures. The cases were grouped according to the bimanual findings as follows: Group 1 contains the cases in which the cancer is clearly localized in the cervix. In Group 2 are placed the cases which show a doughy or edematous consistency of the paracervical tissues. Group 3 includes the cases in which the parametria, the contiguous organs or regional lymphnodes are found invaded; and Group 4 comprises the cases with a frozen pelvis, distant metastases and advanced cachexia from auto-intoxication of broken-down and infected tumors. Group 1 cases complicated with grave constitutional diseases are not subjected to surgery but to radiation therapy. See Table III.

From January, 1914, to December, 1918, we treated 103 primary and 48 recurrent cervical carcinomata with the combined method of x-rays and radium. Of the 103 primary carcinomata 16 passed the five-year limit well and free of recurrence, that is an absolute cure of 14.2 per cent. Of 42 recurrent carcinomata only 2 passed the five-year period, an absolute cure of 4.5 per cent. See Table IV.

The comparison of results obtained in other clinics is of interest. We tabulated in Table V three clinics in which radium alone was used, the total number is 424 with 65 five-year cures or 13.0 per cent; three clinics in which radium and x-rays were used in combination, the total number is 1056 with 146 five-year cures, or 13.8 per cent; and three clinics in which surgery was used, the total number is 918 with 234 five-year cures, or 25.5 per cent.

If we refer to the operability percentage of the various clinics we observe that it is very high in the surgical statistics and very low in the radiologic statistics. We may explain this in two ways: The surgical clinics retained the operable and early cancer cases, and the advanced cases drifted to the radiologic clinics. Low operability percentage means unfavorable material from the standpoints of treatment and prognosis, and therefore low curability. If we consider the absolute curability percentage from this viewpoint we feel that the results obtained with radiation therapy are encouraging.

## CONCLUSIONS

1. The definitions of the radiation dose and the standard unit of dose have been given.
2. The principle of the homogeneous distribution of the rays has been discussed and the measured radiation dose has been described.
3. The difference of radiosensitiveness of unripe- and riper-celled carcinomata has been expressed in per cent of the unit erythema skin



dose. It is deemed essential to determine the measured radiation dose from the microscopic examination of the cervical tissues.

4. The systemic reaction is a nonspecific protein toxicosis caused by the absorption of proteins liberated by the action of the rays. The toxicosis causes an activation of the defensive forces of the host and thereby aids in the reabsorption of the broken-down tissue masses. A persistence of the toxicosis means negative results from the radiation treatment. However the defensive forces may be activated by the use of colloidal metals and foreign proteins.

5. The five-year end-results have been given and compared with those of the surgical treatment. If we consider the operability percentages then the results obtained with radiation therapy are very good.

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(For discussion, see p. 711.)

## RADIATION THERAPY OF CARCINOMA OF THE UTERUS\*

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THE principal advances in roentgen ray therapy within the last year have been technical improvements in apparatus based upon an extending knowledge of the physics of radiation. We now have a more accurate apparatus for the measurement of dosage, and a water cooled Coolidge tube capable of carrying large currents has been developed, by the use of which the time required for treatment has been considerably decreased. Investigations of the biologic effects of radiation have included extensive studies of the effects of radiation on different types of tissues, on glands and malignant growths in particular; but little of actual value except the histopathology has been established, and no explanation of the effects of radiation on the cells has thus far been offered. In this country, roentgen ray therapists have for the most part followed the early example of certain European clinics, administering massive doses of radiation to all types of malignant growths. Within the last year a tendency to moderate this technic has developed. The massive dose method consists in administering as much radiation as possible within a short period of time, this procedure being based upon the theory that radiation produces a specific destructive effect upon neoplastic cells and that, therefore, the maximum number of cells will be destroyed by an overwhelming dose. It has now been established, however, that it is impossible to deliver by roentgen rays much more than

\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

one erythema dose, or 100 per cent E. S. D., to such a deeply situated organ as the uterus or to any other equally limited field, and it is well known that this dosage will not destroy most types of malignant growths. Although most normal tissues, with the exception of certain glands, can withstand an erythema dose without being permanently damaged, a very definite and sometimes severe systemic reaction follows such a dose of roentgen rays delivered over large areas, and consequent nausea, diarrhea, fibrosis and blood changes may lower the vitality and resistance of the patient very considerably.

To avoid these deleterious reactions the present tendency is to moderate the treatment in such a manner as to preserve and build up rather than to diminish the resistance of the patient. It is conceded that there exists an organic resistance to malignancy and that our end will be defeated if this resistance is destroyed by overradiation. Before the advent of deep or short wave therapy, some cases were benefited or even cured by dosage that would not now be considered as therapeutic. It is probable, therefore, that radiation produces some beneficial effect upon the patient in addition to the actual destruction of the malignant cells and that we should endeavor to build up resistance to the disease as well as to destroy neoplastic processes. In any event, we should at least endeavor to do the patient no harm in our zeal to cure.

Several methods for dividing the dose are being used. Some roentgenotherapists apply the radiation for only a few minutes each day over a long period of time. We prefer to administer as large a dose as would be given by the massive dose method, but divided into shorter periods of perhaps one-half hour each, daily or on alternate days, according to the condition of the patient, until the total amount has been administered. We have found that by this method nausea and diarrhea rarely occur and apparently the changes in the blood cells, which probably play an important part in the resistance of the patient, are not so marked. It is our practice to administer a full roentgen ray treatment either before or after a full dose of radium while the patient is under observation in our radiation hospital.

In reviewing the most recently published statistics, it is impossible to reach any definite conclusion as to the value of roentgen ray therapy in the treatment of carcinoma of the uterus. Many reports include the results of combinations of roentgen ray therapy with radium or surgery and many statistics of the results of radium therapy probably include roentgen ray treatment, although it is not always so stated. Roentgenologists have been reluctant to quote results during this transitional period. The results of surgical treatment are well known. The results of radium therapy in the United States vary considerably, probably because of variation in technic and in the amounts of radium used.

In the following summary, however, I shall quote certain statistics of

the results of roentgen ray therapy of cancer of the uterus, published during 1922 and 1923.

Dr. Greenough's<sup>1</sup> recently published report for the *American College of Surgeons* indicates that some benefit apparently results from roentgen ray therapy, though no statement is made regarding the results of x-ray treatment alone. Among the cases in Group I A, hysterectomy alone cured 34 per cent; radium alone 16 per cent; radium with palliative operation and x-ray 42 per cent; radium with or without palliative operation and x-ray 25 per cent. Among the cases in Group I A and I B combined, we find that hysterectomy alone cured 31 per cent; hysterectomy with or without radium 32 per cent; radium alone 12 per cent; radium with palliative operation, or x-ray 37 per cent.

Henry Schmitz<sup>2</sup> reports 11.1 per cent cures among his cases of inoperable cervical cancer and 42.8 per cent cures among the localized and borderline cases. I believe that his method of treatment has been a combination of radium and x-ray with or without a palliative operation.

Douglas Webster<sup>3</sup> quotes Heyman's statistics in 66 cases, of which 94 per cent were inoperable; among these, five year cures were obtained by combined radium and roentgen ray therapy in 28.8 per cent. Dr. Heyman has recently informed me that he has abandoned roentgen ray therapy except in advanced cases, because of the deleterious effects which he has observed.

In 1922, Prof. L. Seitz<sup>4</sup> gave the following two year results: among cases treated by deep roentgen ray therapy combined with radium, apparent cures in 56 per cent; among cases treated with x-ray alone, apparent cures in 53 per cent. Among cases treated during a previous five year period, during which very small doses of radium were used and in which the main effect must have been due to the roentgen rays, he cured 20.7 per cent of the inoperable and apparently hopeless cases.

Van Raamsdonk<sup>5</sup> reports that between 1915 and 1920, he had treated 158 cases, most of them by roentgen ray therapy alone, though in some cases radium was used to check hemorrhage. The Group I cases were operable but total ablation was not performed. These included 3 cases of which 1, or 33.3 per cent, has lived for five years, and 2, or 66.6 per cent have lived without recurrence for three and a half years. The Group II cases were inoperable and of the 106 cases in this group, 13, or 12.3 per cent, were living without recurrence. Group III included cases in which recurrence had occurred after total ablation; among these, 6, or 20.3 per cent, were surviving without recurrence. The cases in Group IV had received prophylactic treatment after total ablation and among 14 cases, 10, or 71.5 per cent, were in perfect health, one and a half to five years after treatment.

E. Muhlmann<sup>6</sup> reports two series of cases of cancer of the uterus treated by combined radium and roentgen ray therapy. In the first series he includes cases treated between 1915 and 1918. In this group there were 30 inoperable or hopeless cases, among which 16 per cent had been free from recurrence for five years. In the second series, comprising cases treated between 1918 and 1920, there were 22 inoperable cases which had been followed for from three and a half to five years; of these 2, or 13.6 per cent, were living and free from recurrence. Among 16 operable and inoperable cases treated during 1920-1921, 6 or 37.5 per cent were still living at the time of this report.

A. Giesecke<sup>7</sup> reports 371 cases of cancer of the uterus. Of the cases of carcinoma of the cervix, among which 70.6 per cent were considered as operable, 26.6 per cent were cured; and 47.62 per cent of the cases of carcinoma of the fundus had been cured by operation followed by roentgen ray therapy. Among

the inoperable cases, 8.33 per cent had been cured by combined radium and roentgen ray therapy.

Opitz<sup>8</sup> reports 21 cases living four and a half years. Six of these cases were in Group I. Of his Group II cases, he reports cures in 33.3 per cent.

Winter<sup>9</sup> reports that 55.6 per cent of his cases in Groups I and II were cured by surgery followed by x-ray therapy, as compared with only 39 per cent cured by surgery without postoperative radiation.

Zacherl and Lundwall<sup>10</sup> report cures in 49.3 per cent of their cases which received postoperative radiation.

Our own experience is too brief to be of value. Since 1920, we have seen 138 cases of carcinoma of the cervix, 87 of which were primary and were treated by radium alone. Of these 138 cases, 48, including 7 operable and 41 inoperable cases, have been observed since we began the use of the present method of combined radium and deep x-ray therapy; 21.9 per cent of these died within two years or less; 40.7 per cent are living six months or less since treatment; 25 per cent have survived for one year or more and 12.5 per cent are still living two years or more since treatment. There were 7 operable cases all of whom are living. From these statistical studies we may conclude that the average curability of *inoperable* carcinoma of the cervix by combined radium and x-ray therapy should be at least 12 per cent. The curability of operable cases, or Group I, is problematic although Schmitz states that he cures 75 per cent and Opitz claims 100 per cent cures in a small group of cases; final conclusions, however, cannot yet be drawn. Hysterectomy followed by radiation shows an average of 40.3 per cent cures, a slightly higher figure than that obtained from hysterectomy alone.

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(For discussion, see p. 711.)

# THE RÔLE OF RADIUM IN THE TREATMENT OF CANCER OF THE CERVIX\*

BY THOMAS E. JONES, M.D., CLEVELAND, OHIO

(From the Cleveland Clinic.)

INASMUCH as the choice of treatment in any disease should be guided by a comparison of the accumulated end-results secured by different observers, I am offering the following report based upon a comparative study of the results secured in 166 cases of cancer of the uterus which have been under treatment in the Cleveland Clinic during the past four and one-half years. Of these, twenty-nine were treated by surgery alone, seventeen by surgery and radiation, and one hundred and twenty by radiation. This report is confined to a study of the results obtained in the cases of cancer of the cervix included in the last two groups.

Table I shows nine cases that were treated four or more years ago. The average age was forty-five years; the average duration of symptoms, seven and one-half months; four cases were in Group III, that is, *both* the parametrium and the vagina were involved; and five cases were in Group II in which *either* the parametrium or vagina was involved. The type of malignancy in each of the cases in these two groups was squamous-celled carcinoma. Among these nine patients, *three or 33 per cent are known to be living and free from all symptoms. One lived for forty-six months. One case has not been traced.* The average duration of life in those patients who died was seventeen months.

TABLE I

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1920.

No.	AGE	DURATION SYMPTOMS	TYPE	DIAGNOSIS	DURATION OF LIFE SINCE RADIATION	
					STILL LIVING	DEAD
1	35	6 mos.	II	Sq. ca.	52 mos.	
2	45	12 mos.	III	Sq. ca.		16 mos.
3	63	6 mos.	II	Sq. ca.		46 mos.
4	38		III	Sq. ca.		Not heard from
5	42	12 mos.	II	Sq. ca.	48 mos.	
6	45	4 mos.	III	Sq. ca.		8 mos.
7	50	12 mos.	II	Sq. ca.	48 mos.	
8	42	2 mos.	II	Sq. ca.		7 mos.
9	45	6 mos.	III	Sq. ca.		8 mos.
9	Av. 45	Av. 7½ mos.	5-II 4-III	Sq. ca.	3 or 33%	Av. 17 mos.

\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

Table II shows a series of eighteen cases treated three or more years ago. The average age of the patients in this group was fifty-one years; the average duration of symptoms, twelve months. The three cases diagnosed as belonging to Group IV, showed an extensive involvement in the pelvis and were, therefore, looked upon as hopeless. Nine were in Group III, four in Group II and two in Group I. In three cases the pathologic diagnosis was adenocarcinoma; in fifteen, squamous-celled carcinoma. Of these eighteen patients, *four or 22 per cent were known to be living and free from symptoms at the end of three years*. The fact that this percentage is not as high as the percentage of four year survivals may be explained by the following facts: (1) The average duration of symptoms in the series treated four years or more ago was seven months, whereas in this second series the average duration of symptoms was twelve months. (2) Three of the second series were hopeless cases of which there were none in the first series. (3) One patient who had lived for thirteen months and was clinically cured, died of heart disease and *one has not been traced*.

Table II shows a series of twenty cases treated in 1922. The average age was forty-seven years, the average duration of symptoms, nine months. Three of these twenty cases were in Group I, three in Group II, nine in Group III and five in Group IV. The pathologic diagnosis was squamous-celled carcinoma in seventeen cases and adenocarcinoma in three. *Eight patients or 40 per cent are known to be living*, an average of twenty-six months after treatment. Six are known to be dead and *six have not been traced*.

Table IV gives the average results in a series of forty-two cases treated less than two years ago. The average age was fifty-two, the average duration of symptoms, eleven months. Eleven of these cases were in Group IV, thirteen in Group III, twelve in Group II, six in Group I. Of these, *twenty-six or 60 per cent are known to be living*; two-year figures are not conclusive however. Practically all of these cases have been treated with deep x-ray therapy and it remains to be seen whether the four and five year results will be better in this group than in the previous series in which radium alone was used in nearly all cases.

In Table V which gives statistics published by Heyman of Stockholm it will be noted that an average of from 26 to 32 per cent of the cases treated in 1914, 1915 and 1918 remained symptom-free for five years or more. During a recent conversation with Professor Heyman he said that he thought the very low survival percentages for the cases treated in 1916 and 1917 were due to two facts: (1) The results of previous years were so good that a number of the leading surgeons and gynecologists in Sweden stopped operating on cancer of the cervix and Professor Heyman's Institute became overcrowded. He had only

TABLE II

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1921

No.	AGE	DURATION SYMPTOMS	TYPE	DIAGNOSIS	DURATION OF LIFE SINCE RADIATION	
					STILL LIVING	DEAD
1	35		III	Sq. ca.		4 mos.
2	34		III	Sq. ca.		5 mos.
3	50		II	Sq. ca.		20 mos.
4	53	24 mos.	III	Sq. ca.		23 mos.
5	41	2 mos.	II	Ad. ca.		11 mos.
6	48		III	Sq. ca.		9 mos.
7	57	12 mos.	I	Ad. ca.	40 mos.	
8	56	12 mos.	II	Sq. ca.		11 mos.
9	57	9 mos.	IV	Sq. ca.		Date not known
10	56	9 mos.	IV	Sq. ca.		Date not known
11	46	8 mos.	III	Sq. ca.	36 mos.	
12	33	24 mos.	II	Sq. ca.	36 mos.	
13	67	12 mos.	III	Sq. ca.		13 mo.—heart
14			I	Sq. ca.		Not heard from
15	55	4 mos.	III	Sq. ca.		Date not known
16	73		IV	Sq. ca.		8 mos.
17	70		III	Ad. ca.		19 mos.
18	33	12 mos.	III	Sq. ca.	32 mos.	
18	51	Av. 12 mos.	3-IV	3 Ad. ca.	4 or 22%	13 Dead
	Av.		9-III	15 Sq. ca.		1 Not heard from
			4-II			1 Dead heart disease
			2-I			

TABLE III

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1922

No.	AGE	DURATION SYMPTOMS	TYPE	DIAGNOSIS	DURATION OF LIFE SINCE RADIATION	
					STILL LIVING	DEAD
1	52		III	Sq. ca.		12 mos.
2	58	9 mos.	III	Ad. ca.		Not heard from
3	57	7 mos.	IV	Sq. ca.	30 mos.	
4	35	6 mos.	I	Sq. ca.	28 mos.	
5	60	6 mos.	II	Sq. ca.		14 mos.
6	55	12 mos.	IV	Sq. ca.		5 mos.
7	37	12 mos.	III	Sq. ca.	28 mos.	
8	29	4 mos.	II	Ad. ca.	28 mos.	
9	35		III	Sq. ca.		Not heard from
10	40		IV	Sq. ca.		8 mos.
11	57	12 mos.	II	Sq. ca.	26 mos.	
12		15 mos.	III	Sq. ca.	24 mos.	
13	37		IV	Sq. ca.		9 mos.
14	24		III	Ad. ca.		Not heard from
15	56		I	Sq. ca.	22 mos.	
16			III	Sq. ca.		Not heard from
17	55		III	Sq. ca.		11 mos.
18	68	16 mos.	IV			Not heard from
19			III			Not heard from
20	35		I	Sq. ca.	22 mos.	
20	Av.	9 mos.	3-I	Sq. ca.	8 or 40%	6 dead
	47		3-II			6 not heard from
			9-III			
			5-IV			

a limited amount of radium (about 110 mg.) but in his enthusiasm he tried to do something for every case, with, as he believes, a resultant under-dosage. (2) Sections for pathologic examination were taken at every visit of the patient. He believes this procedure is a decided mistake and has abandoned it.

TABLE IV

RESULTS OF RADIUM THERAPY IN CASES OF CARCINOMA OF THE CERVIX TREATED DURING 1923 AND 1924 TO DATE

No.	AGE	DURATION SYMPTOMS	TYPE	LIVING	DEAD	NOT HEARD FROM
42	Av. 52	Av. 11 mos.	II-IV 13-III 12-II 6-I	26 or 60%	6	10

TABLE V

RESULTS OF RADIATION IN CARCINOMA OF THE UTERUS  
(Heyman, Stockholm.)

SYMPTOM FREE FIVE YEARS AFTER COMMENCEMENT OF TREATMENT

Of 26 cases	1914	7	26.9 per cent.
" 40 "	1915	13	32.5 per cent.
" 47 "	1916	4	8.5 per cent.
" 63 "	1917	9	14.3 per cent.
" 41 "	1918	11	26.8 per cent.

TABLE VI

RESULTS OF RADIUM THERAPY IN RECURRENT CASES OF CARCINOMA OF THE UTERUS

No.	AGE	LOCATION	OPERATION	RECURRENCE	DURATION OF LIFE SINCE RADIATION	
					STILL LIVING	DEAD
1	31	Cervix	Total hyst.	9 mos. after op.		9 mos.
2	45	Cervix	Total hyst.	6 mos. " "		12 mos.
3	40	Cervix	Percy cautery Total hyst.	3 mos. " "		9 mos.
4	55	Fundus	Total hyst.	4 mos. " "		12 mos.
5	55	Fundus	Total hyst.	6 mos. " "		12 mos.
6	55	Fundus	Total hyst.	4 mos. " "		1½ mos.
7	43	Fundus	Total hyst.	27 mos. " "	18 mos.	
8	46	Cervix	Total hyst.	5 mos. " "	4 mos.	

Table VI gives the results in a series of eight cases in which there was recurrence in the vault of the vagina following hysterectomy—in four cases for carcinoma of the fundus and in four cases for carcinoma of the cervix. In six of these eight cases, the average duration of life after radiation was nine and one-half months; of the other two cases the patients are still living, one eighteen months, and one four months after treatment. I feel that the percentage of cures in this group of recurrent cases will be very low as in such cases it is very difficult to administer sufficient radiation.



Table VII gives the results in a series of seven cases in which hysterectomy—with the Percy cautery in two cases—plus radium was used. Six of these seven patients are dead; the one remaining patient

TABLE VII

RESULTS OF SURGERY PLUS RADIUM IN THE TREATMENT OF CARCINOMA OF THE UTERUS

No.	AGE	LOCATION	OPERATION	COMPLICATION	DURATION OF LIFE SINCE OPERATION	
					STILL LIVING	DEAD
1	28	Cervix	Percy cautery. Total hyster. Radium	Vesicovaginal fistula		11 mos.
2	31	Cervix	Partial hyst. Radium and x-ray	none		15 mos.
3	29	Cervix	Percy cautery. Total hyst. Radium	Abdominal fecal fistula		8 mos.
4	60	Cervix	Total hyst. Radium and x-ray	none		16 mos.
5	57	Uterus Vagina	Supravag. hyst. Radium and x-ray	none		13 mos.
6	67	Uterus	Attempted vag. hyst. Radium	Vesicovaginal fistula		4 mos.
7	36	Cervix	Total hyst.	none	3 mo.	.

was living three months after treatment but has not since been heard from. Because of these discouraging results, the use of surgery plus radium in the treatment of cancer of the uterus has been abandoned.

#### CONCLUSIONS

According to the statistics given in these tables, 33 per cent of the cases treated four or more years ago, 22 per cent of those treated three or more years ago, 40 per cent of those treated two or more years ago and 60 per cent of those treated less than two years ago are known to be symptom free. We feel that these results justify the continued use of radiation therapy for carcinoma of the cervix.

EAST NINETY-THIRD STREET AND EUCLID AVENUE.

(For discussion, see p. 711.)

# A NEWLY MODIFIED METHOD FOR DETERMINING THE AREA OF THE PELVIC INLET BY X-RAY PELVIMETRY

BY HERBERT THOMS, M.D., F.A.C.S., NEW HAVEN, CONN.

IN 1922, the author described a method by which x-rays could be used in determining the outline of the inlet or superior strait of the pelvis.<sup>1</sup> Since that time we have used the method repeatedly in our work at Grace Hospital with uniformly successful results. At the present time, however, the technic formerly described has been considerably simplified by the introduction of a lead screen, the use of

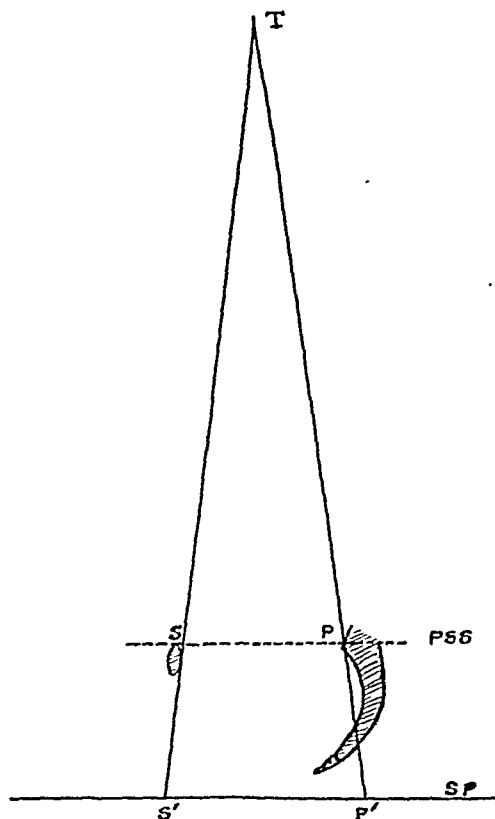


Fig. 1.—*T*, Target or tube; *PSS*, Plane of superior strait, *SP*, sensitive plate, *S*, symphysis; *P*, promontory of sacrum.

NOTE. If the plane of the superior strait is parallel with the sensitive plate, the rays from the target will project the outline of the superior strait to points *S'* and *P'* on the plate. The outline of the superior strait will be thus outlined equally enlarged in all directions. If a screen composed of squares, each representing a square centimeter, is placed in the same plane as the superior strait, it is obvious that the transmitted image will give the amount of enlargement of the superior strait. In other words, each square seen on the sensitive plate represents one square centimeter at the superior strait and readings may be made accordingly.

which is described below. This addition obviates the use of both the pelvimeter and the reducing-camera described in the previous communication.

The method as it is now being used is here set forth. The underlying principle is best understood by studying Fig. 1. It is obvious that if the plane of the superior strait is made parallel to the sensitive plate, an outline of this plane may be obtained upon the latter which will be enlarged equally in all directions. If after taking this picture we introduce in the exact position as that occupied by the superior strait, a screen composed of small squares of lead, each one centimeter square, we may project upon another sensitive plate a series of squares

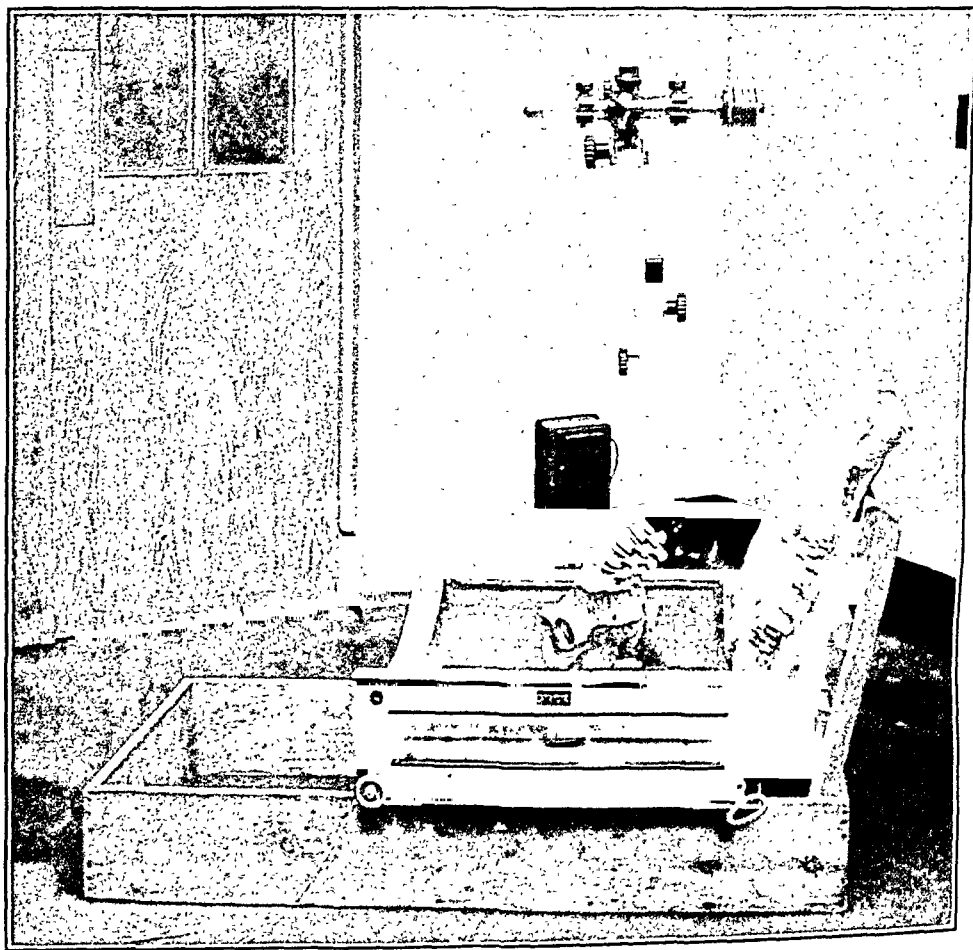


Fig. 2.

each representing one square centimeter at the plane of the superior strait. By viewing the two plates (or films) together in a view box, the area of the pelvic inlet in terms of centimeters becomes at once apparent.

*The Position of the Patient.*—This is best understood by studying Figs. 2 and 3. In the former a Bucky diaphragm is shown mounted on a chair-like frame upon which the patient sits. A bony pelvis is shown in the position occupied by the patient's pelvis and the tube or target is placed above the center of this. Fig. 3 shows the patient in

position for the exposure. It is necessary, however, to fulfill two conditions before the exposure may be made, namely, the superior strait must be made parallel or nearly so with the sensitive plate, and the distance of the superior strait from the latter measured. This is accomplished in the following manner: For purposes of identification a small tab of adhesive is placed on the patient's skin at a level with the upper border of the symphysis in the midline, and another tab in the depression under the spine of the last lumbar vertebra. It will be

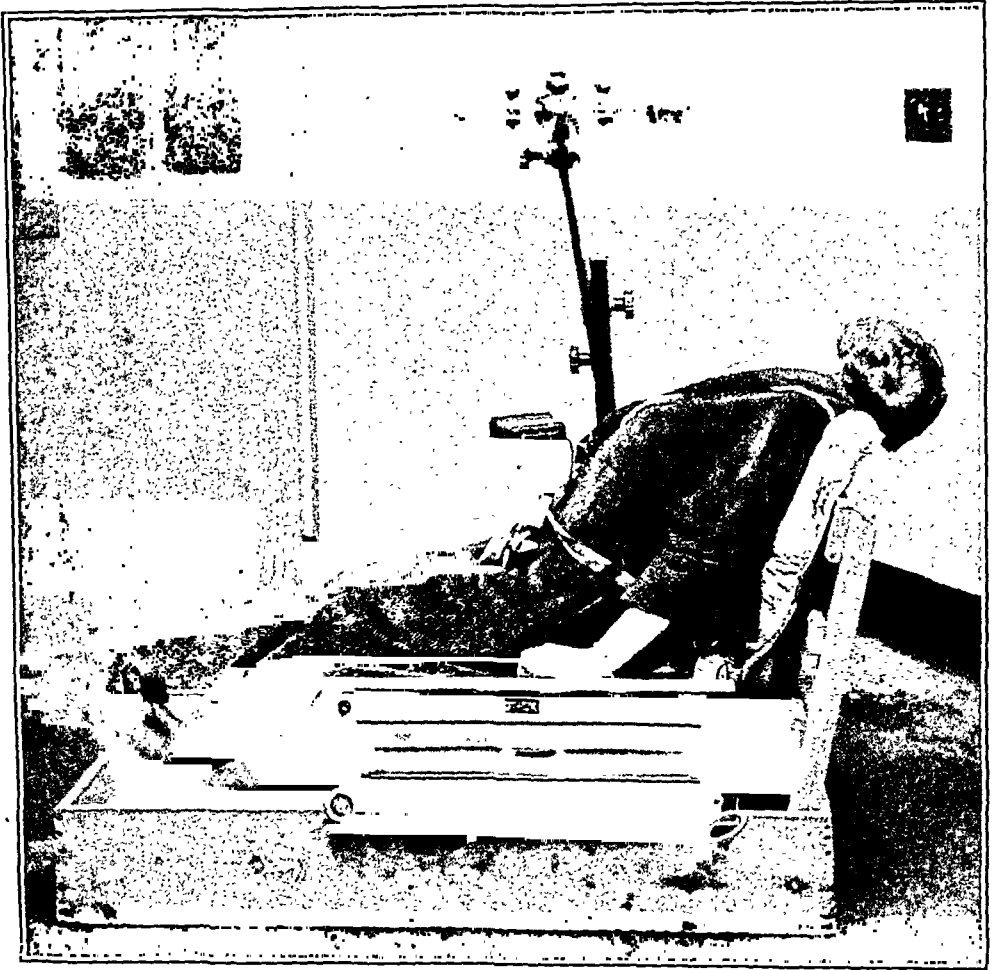


Fig. 3.

remembered that an imaginary line passing through these two points follows the course of the anteroposterior diameter of the superior strait. The patient is now placed on the frame in the manner shown by the illustration. She is asked to arch her back as much as possible and it will be noticed that the posterior tab tends to become equidistant from the sensitive plate with the anterior tab. In other words the plane of the superior strait has become horizontal or nearly so. If the posterior point is slightly below the anterior point (which may happen in an occasional case) the result will not be measurably af-

fect. Careful measurements of the distance of these two points above the center of the Bucky diaphragm is now made. This is done in order that the screen may be set in the same plane for the second exposure which is explained later.

*The Exposure.*—It is quite obvious that with the patient in this position an unusual amount of tissue must be penetrated and, therefore, an exposure somewhat as follows must be employed. A seven inch spark gap is used. A superspeed film with the Bucky diaphragm is necessary. The tube is placed at least 36 inches above the latter and an exposure of 120 ma.sec. used. This latter varies somewhat, of course, with the size of the patient.

*The Lead Screen.*—It is apparent that if ordinary wire screen of centimeter mesh is used that the result on the sensitive plate would be a series of impermeable black squares through which nothing could be viewed. The problem, therefore, in the preparation of the screen is one of an opposite character. That is a screen composed of tiny lead or metal squares each representing a square centimeter. This

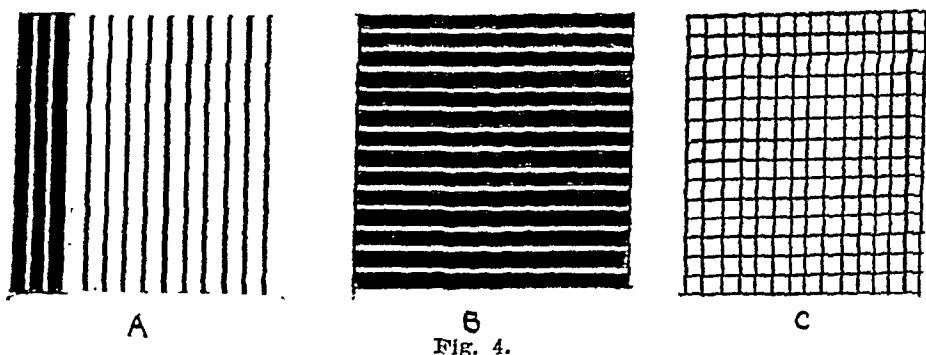


FIG. 4.

would be extremely difficult and is quite unnecessary. A board is mounted with lead strips so placed that the interspaces are exactly one centimeter apart (Fig. 4). It is obvious that if an exposure is made through the screen in position A and another exposure on the same plate made with the screen in position B the result on the sensitive plate will be that shown at C, namely, a series of lines enclosing squares each representing one square centimeter.

*Use of the Lead Screen.*—Following the exposure made of the patient's pelvis, the screen is placed over the Bucky diaphragm in the same plane as that occupied by the superior strait. This is determined by the measurements previously taken of the points marked by the adhesive tabs. That is the distance from the center of the diaphragm to each point when the patient is in position for exposure. The exposure of the screen is as follows: Tube in same position as that for patient. Spark gap  $3\frac{1}{2}$  inches, slow film, each exposure  $\frac{1}{4}$  second running 5 m. a.

*The Results.*—The two films are developed, dried, and viewed. The first film shows the outline of the inlet of the patient's pelvis equally

enlarged in all directions and the second film shows a series of lines encompassing a series of transparent squares. By superimposing one film on the other in the view box, the plane of the superior strait will be shown divided into squares each representing one square centimeter. The measurement in centimeters of the area or any diameter of the superior strait becomes at once apparent. (See Fig. 5.)

#### COMMENT

We have in the foregoing described a technic for measuring the superior strait of the pelvis which offers to the obstetrician many advantages over the ordinary methods of pelvimetry. An authority has



Fig. 5.

suggested that x-ray methods are not applicable in the latter months of pregnancy. This, however, has not been our experience as we have secured satisfactory pictures for mensuration even up to and including the last month of pregnancy. In this connection it has been suggested that the fetal head would interfere with obtaining a good outline of the pelvic rim. It will be remembered that with the patient

in the position here described the fetal head is much further away from the plate than when taking the ordinary anteroposterior picture. Furthermore, with the materially increased lime salt content of the mother's bones over that of the fetus it becomes apparent why in our pictures during the latter part of pregnancy the fetal head is often represented as not more than a very faint outline.

I have found the method of very great usefulness in women presenting themselves in early pregnancy with external measurements slightly under normal. It is in these cases at this time that exact knowledge of the area and shape of the pelvic inlet is greatly appreciated and it is in just these cases that one is so often surprised at the amount of pelvic room present.

It is apparent that such a screen may be used for other purposes of mensuration than that of the pelvic inlet or pelvic bones. At present we are working to use the technic in measuring the size of the fetal head, particularly the biparietal diameter in those cases which present slight or moderate overriding at term. At a later date in the near future these results will be published. In conclusion, I again wish to thank L. H. Wheatley of New Haven for the opportunity he has afforded in the use of Roentgenological Department of Grace Hospital and for his very valuable help in working out the exposures and points in x-ray technic with which I am unfamiliar.

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59 COLLEGE STREET.

(For discussion, see p. 715.)

## INSULIN AND GLUCOSE TREATMENT OF EXCESSIVE VOMITING OF PREGNANCY\*

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*(From the Laboratories of Columbia Hospital.)*

THE use of insulin combined with the administration of glucose in the treatment of excessive vomiting of pregnancy, has been demonstrated previously<sup>1</sup> to rapidly alleviate the symptoms and acidosis in eight patients suffering from this condition. In this communication successful treatment with this method will be reported in two additional patients, making ten in all.

The rationale for this treatment has been stated in previous publications<sup>1</sup> but will be reviewed briefly. Patients with excessive vomiting in the early months of pregnancy develop a marked acidosis, in the sense that their blood alkali reserve is considerably lowered and severe ketonuria is present. This type of acidosis seems to cause nausea and vomiting, judging from experience with patients suffering from severe postoperative vomiting and acidosis. Inability to retain food itself causes a starvation acidosis, and the acidosis which is already present when these patients enter the hospital in the early months of pregnancy, is thereby intensified by the vomiting. If this is true, it constitutes a vicious cycle, and by eliminating the acidosis, the vomiting should cease. This has been accomplished by administering insulin hypodermically and glucose intravenously in ten patients.

It must be recalled that Titus, Hoffmann, and Givens<sup>2</sup> and Duncan and Harding,<sup>3</sup> working independently, have recorded excellent results from the administration of glucose alone, in large groups of patients having excessive vomiting of pregnancy. However, when insulin is given along with the glucose, vomiting ceases, and the patient's condition improves in a much shorter time than is stated in the papers of these investigators as a result of glucose therapy alone. The investigation of glucose therapy has been continued by Titus and by Harding, and each has elaborated in a somewhat different manner the theory that vomiting of pregnancy, either excessive or slight, is caused entirely by a deficiency of carbohydrates.

Harding and Potter<sup>4</sup> have shown in an extremely interesting study, that in these patients, the clearing up of ketonuria, and the reduction of the excessive urinary output of nitrogen occurs in about seven days, following the administration of glucose. Whether the "carbohydrate deficiency theory" alone is sufficient to explain the etiology of this condition, will depend on even more investigation than has

\*Read at a meeting of the New York Obstetrical Society, February 13, 1925.



been devoted to this field. A number of interesting facts warrant this further study. Williamson<sup>5</sup> and others have shown that there is present throughout pregnancy a slight or moderate reduction of the blood alkali reserve; and Rowe, Banks and Alcott<sup>6</sup> have demonstrated a reduction of the tension of carbon dioxide of the alveolar air. The following ideas suggest themselves. Might these data indicate that in pregnancy there is a fundamental change in carbohydrate metabolism, and not merely a carbohydrate deficiency? Does the glycosuria in pregnancy following a small dose of phloridzin also indicate a change in carbohydrate metabolism, or only an increased permeability of the kidneys to glucose? Since excessive vomiting of pregnancy is a disease of early pregnancy, is the carbohydrate metabolism deranged until the beginning of the development of the fetal pancreas? These and other questions need investigation.

The discovery of insulin has not only made it possible to control diabetes, but has opened up many new problems on carbohydrate metabolism, and has afforded a means for the investigation of many of these problems. Nevertheless, even after many searching studies, the exact mechanism of insulin's action is not known. Even the relationship of insulin to the pancreas is obscure at present, since insulin has been found present in large amounts in various body tissues, and even in the tissues of individuals dying from diabetes. One must be careful, therefore, not to identify insulin too closely with the internal secretion of the pancreas. Whereas this seemed to be proved by Banting's remarkable discovery, later studies have made this an open question. But no matter what insulin is, or what the mechanism of its action on carbohydrate metabolism, it does control diabetes when properly administered. It also causes the disappearance of some types of severe nondiabetic acidosis even more rapidly than it relieves the coma of diabetes, and relieves these types of nondiabetic acidosis when given along with glucose more rapidly than glucose alone relieves them. Because of this, and because of the results achieved, the criticism that the treatment of excessive vomiting of pregnancy with insulin "is vague endocrine therapy," does not appear to be valid criticism. It is hoped that this method of therapy will receive the rigid test of trial by many obstetricians.\*

For the time being, this treatment should be reserved for the extremely sick. These patients should be treated in hospitals only, and require incessant watching during the treatment by a competent nurse or interne. If there is a marked ketonuria, even if the determination of the blood alkali reserve is not possible, this treatment should be used. The blood alkali reserve should be determined, and in severely ill patients the carbon dioxide combining power of the plasma will

\*Since this communication was presented, W. M. Le Fevre reported in the *Journal of the Michigan State Medical Society*, March, 1925, the successful treatment, with a modification of this method, of four patients with the milder degrees of vomiting of pregnancy.

be found to be between 35 and 40 volumes per cent (Van Slyke's method).<sup>\*</sup> These patients are moderately or severely dehydrated, and are given intravenously, very slowly (during four to five hours), 1000 c.c. of 10 per cent glucose solution, or if severely dehydrated, 2000 c.c. of 5 per cent glucose solution. (Injection at this rate will not cause an increase in blood pressure above normal and perhaps no increase at all.) An apparatus has been devised which can be sterilized in an autoclave and kept ready for use.<sup>7</sup> The glucose solution should be carefully prepared from the highest purity glucose, and should be absolutely colorless, after it has been autoclaved.

Most patients do not object to lying quietly during the time the glucose is being given. One unit of insulin<sup>\*\*</sup> is given for every three grams of glucose. For one hundred grams of glucose thirty units of insulin are given in divided doses, twenty units one hour after beginning the intravenous infusion of the glucose, and ten units after the second hour. This is somewhat less than one unit for three grams of glucose, but has never caused insulin shock, and has eliminated the ketonuria in from six to eight hours. Some glycosuria always occurs, but need cause no alarm, as it causes no renal damage. Some patients will fall asleep while the glucose is being given. Some who claim to have retained little or nothing for days will ask for nourishment while receiving the intravenous glucose, and will retain it. Some patients require only one treatment, whereas others require several. One must be guided in the frequency and number of treatments by clinical judgment controlled by examinations of the patient's blood and urine. Probably the most important points to be stressed are: to administer the glucose intravenously (since rectal administration is uncertain, and subcutaneous administration is apt to be painful); to be sure to give both enough glucose and enough fluid intravenously; and to give enough insulin.

CASE 1.—Mrs. H. S., aged twenty years, was admitted to Milwaukee Hospital April 17, 1924. She was six to eight weeks' pregnant. For three weeks she had vomited almost everything. Urine contained four-plus acetone on admission, and on the following morning. During the first eighteen hours she received 500 c.c. of 1 per cent glucose and soda bicarbonate *per rectum* by the drip method, also morphine, grains  $\frac{1}{6}$ . The patient continued to vomit frequently.

The next morning the patient was seen in consultation by Dr. W. H. Shutter and was given 750 c.c. of 10 per cent glucose intravenously, beginning at 10 A.M., and insulin in doses of ten units at 10 A.M., 11 A.M., and at noon. She vomited once at 1 P.M., and not after that.

The urine examination, showed at 2 P.M., acetone one-plus, at 4 P.M. acetone one-plus, and at 9 P.M. reaction for acetone suggestive only.

The patient began retaining nourishment at 2 P.M., after which feedings were given at intervals of two to three hours, no further vomiting occurring. She

<sup>\*</sup>Studies of hydrogen-ion concentration in the blood are now being made.

<sup>\*\*</sup>Insulin-Lilly has been used in this investigation.

left the hospital in good condition five days later, and went through her pregnancy in a normal manner, with normal delivery of a normal baby.

CASE 2.—Mrs. V. G., patient of Drs. Carl Henry Davis and C. H. Stoddard, was admitted to Columbia Hospital at 8 P.M., January 12, 1925. The patient was thirty-two years old, a primipara, and about eight weeks' pregnant. Vomiting began one month before admission, rapidly became worse, and during the last few weeks she retained practically nothing. During this time she lost over thirty-six pounds in weight.

For years the patient had been subject to so-called bilious attacks accompanied by vomiting. She has had to be very careful in her choice of diet, and had a definite idea as to what foods would or would not agree with her.

Her condition when she entered the hospital was that of marked dehydration, with eyes deep sunken, and with deep circles about them, and she had a very anxious expression. Her pulse rate was 120, and the volume was small. The urine was loaded with both acetone and diacetic acid, giving a four-plus reaction for each of these, but did not contain albumin.

During the first fourteen hours the patient was given retention enemas of glucose solution with bromides. The patient vomited almost continuously during the night, and the amount of acetone and diacetic acid in her urine the next morning remained the same. During the forenoon she was given 1000 c.c. of 10 per cent glucose intravenously, which was administered slowly, during five hours. At the end of the first hour 20 units of insulin were given hypodermically, and 10 units at the end of the second hour. By 8 P.M. acetone and diacetic acid had disappeared from the urine. The next morning four-plus amounts of acetone and diacetic acid were again present in the urine, and another treatment with glucose and insulin was given. This time 2000 c.c. of 5 per cent glucose were given instead of 1000 c.c. of 10 per cent, but the same doses of insulin were repeated. In six hours the urine was again free of acetone and diacetic acid. The patient's condition was considerably better. She lost the appearance of dehydration and her anxious look. Although she still vomited considerably, she retained orange juice and peptonized milk. At this time, because the improvement in her condition warranted it, an attempt was made to pass a duodenal tube so as to give feedings through the tube. This maneuver was controlled by the fluoroscope and the metal tip was forced back from the stomach into the esophagus not once, but several times. Glucose was not administered intravenously for forty-eight hours, although acetone and diacetic acid returned in the urine from time to time in two- or three-plus amounts. At the end of this forty-eight hour period, although the patient appeared definitely out of danger, she still vomited about one-third of her nourishment. On three successive days she was given 2000 c.c. of 5 per cent glucose intravenously, along with thirty units of insulin hypodermically. At the end of this time, the patient had a definitely healthy look, vomited only occasionally, and most of the time showed no urinary acetone and diacetic acid, although occasionally a one- or two-plus reaction was obtained. During this interval her diet was gradually being increased, keeping the fats low, about 70 grams per day, protein about 60 grams per day, carbohydrate from 200 to 250 grams per day.

The last day on which she vomited, was sixteen days after she entered the hospital, although for a number of days before this it seemed certain from various observations that we made, that there were only psychologic reasons for the vomiting. She had decided several days after treatment was begun that she could take only two and a half ounces of peptonized milk at a time. If we insisted on her taking the remainder of the three ounce feeding, she always

vomited. When the nurse brought her a four ounce feeding, but assured her that it was only three ounces, she would take three and a half ounces without vomiting. We believe that the patient had acquired a vomiting habit during her life, which was intensified during this illness. She was an extremely difficult patient to handle as regards feeding, and in many other ways. When she was admitted she was more desperately ill than any other patient with excessive vomiting whom we have treated with this method. Dr. Davis believed that if her condition had not improved, and if the acidosis had not been controlled, it would have been fatal to have induced an abortion. Although it took much longer than usual to cause a cessation of vomiting in this patient, nevertheless as early as twenty-four hours after treatment was started, her condition and appearance were so improved, that we no longer felt that she was desperately ill, and believed that had it been necessary, the uterus could have been emptied with safety.

The patient left the hospital four weeks after she had entered it, and now, one month later, has had no recurrence of vomiting, and is in excellent condition, her weight now being 124 pounds, a gain in weight since she left the hospital, but not yet up to her weight of 156 pounds before her illness.

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(For discussion, see p. 716.)

### THREE TYPES OF URETERAL PATHOLOGY WITH UNUSUAL CLINICAL FEATURES\*

BY EDWARD H. RICHARDSON, M.D., F.A.C.S., BALTIMORE, MD.

MY theme has to do with ureteral pathology, a subject which I think merits the serious attention of everyone engaged in the practice either of obstetrics or gynecology. I am not qualified to speak authoritatively from the standpoint of the obstetrician, because I have never practiced obstetrics, but if there is any single conviction that stands out more clearly than all others from nearly twenty years of experience in the combined practice of gynecology, general abdominal surgery in women and female urology, it is that the training of specialists in this field should always include a mastery of female urology. My observation has been that the female urologic patient is far too often the surgically scarred patient. The women of this country have paid a staggering price in the sacrifice of gall bladders, appendices and ovaries, in addition to the annual toll of exploratory laparotomies for supposed adhesions, because the rank and file of surgeons still refuse to interpret with intelligence the intimate anatomic and pathologic relationship now commonly known to exist between the urinary and the reproductive systems in women.

Notwithstanding the substantial advance that has been made during recent years in our knowledge of ureteral disease, particularly in women, there still exists a widespread scepticism in the minds of the profession concerning certain phases of this subject. The explanation is to be found, I believe, in the fact that, while the accumulated records of clinical observations, ingenious diagnostic procedures and therapeutic successes are amply sufficient to meet the most exacting scientific demands, there is still a relative paucity of convincing pathologic data. It seems desirable, therefore, whenever the circumstances permit, to supply this deficiency. Hence my reason for the following brief report of three such instances.

CASE 1.—In December, 1920, one week after a difficult panhysterectomy by the short method, performed by me at the Johns Hopkins Hospital for benign uterine disease, in a multipara, fifty years of age (Mrs. M. T.), there developed leakage of urine. Preceding this, there was a brief but sharp febrile reaction associated with pain of moderate severity referred to the left side of the abdomen. When accurate investigation became possible three weeks later, it was found that the leakage was coming from a tiny fistula in the scar at the vaginal vault. Failure of methylene blue solution introduced into the bladder to appear in the vagina showed that we were dealing with an ureteral fistula. The patient was permitted to leave the hospital in hopes that spontaneous closure might take place. This

\*Read at a meeting of the Obstetrical Society of Philadelphia, December 4, 1924.

did not occur. Five months later she was readmitted to the hospital and a complete cystoscopic study was made. From this it was determined that the fistula was in the left ureter, 1.5 cm. above the bladder, and that with each peristaltic wave there occurred a simultaneous spurt of urine both through the fistula into the vagina and through the ureteral orifice into the bladder. Further investigation showed that the fistula area was involved in an extremely dense traumatic stricture which had so narrowed and distorted the ureteral lumen as absolutely to prevent the successful passage of any type of catheter, bougie, or filiform through the tortuous channel. A differential phthalein test, in which the excretion from the right kidney was obtained direct through a renal catheter and that from the left kidney partly transvesically and partly through the fistula, showed that the functional value of the left kidney was equal to that of the right, although the total of both was somewhat below normal. It was highly desirable, therefore, to save the left kidney, if possible, rather than follow the usual procedure in such cases and do a nephrectomy. On May 26, 1921, a plastic operation was undertaken for the purpose of closing the fistula and reestablishing the continuity of the ureteral lumen. Operative accessibility and adequate exposure of the fistula area were obtained by means of the Sims posture, preliminary widening of the vaginal orifice through deep incision of the perineum and traction sutures. A small opening was then made into the bladder adjacent to the fistula and ureteral orifice. It was then possible to free the ureter of the scar tissue surrounding it and thoroughly to dilate its bladder segment. A large renal catheter was passed through the urethra into the ureteral orifice and carried well up past the fistulous opening into the normal ureter beyond; thus reestablishing the normal channel. After mobilizing the bladder on all sides, it was then quite simple to invaginate the fistulous opening together with the distal ureteral segment into the bladder, the suture line being reinforced by approximating the vaginal wall over it. The ureteral catheter was left in for ten days. The wound healed kindly and the patient was discharged apparently cured three weeks after the operation. Five months later she returned for observation and a cystoscopic examination showed the left ureter to be functioning normally. A catheter was readily passed to the kidney pelvis, although there was present a demonstrable narrowing of the lumen in the old fistula region. She refused to have this dilated, however, and returned home. A recent letter from her states that she is having no symptoms whatever, referable to the left urinary tract. This case exemplifies the cure of an uretero-vaginal fistula associated with a demonstrated traumatic stricture of the ureter.

CASE 2.—In the spring of 1923, Miss E. N., 23 years old, an undergraduate nurse in the training school of the Johns Hopkins Hospital, began to suffer from lumbar backache, which was aggravated by exercise. In July, 1923, while irrigating an osteomyelitis cavity, pus splashed into her right eye causing a conjunctivitis, which cleared up in 3 or 4 days under treatment. Two weeks later a furuncle developed on her chin and persisted for six days. Early in August, a second one developed on her right cheek and she was admitted to the surgical service of the hospital. This one also subsided in six days under conservative treatment. During her brief stay in the hospital, however, she had a questionable transient hematuria. Upon being discharged from the surgical service, she went to her home in Mississippi for four weeks. While there she developed a third furuncle on her face, which was incised by the local physician. In addition, throughout her stay at home she felt badly, ran a continuous fever, often up to 101° and on two occasions had night sweats. Three weeks prior to her second admission to the medical service of the Johns Hopkins Hospital on September 17, 1923, she developed a fourth furuncle on the right cheek. A culture from this

showed a pure growth of *Staphylococcus aureus*. In addition to the furuncle, the physical examination revealed a palpable right kidney with decided tenderness in the right hypochondrium and right costovertebral angle. These signs persisted with varying intensity throughout her eight weeks stay in the hospital. In addition she had frequent mild hematuria, a daily range of temperature from 96° to 101°, and one sharp attack of apparent renal colic on the right side. She was seen by a number of medical and surgical consultants. Tentative diagnoses of renal tuberculosis, *Staphylococcus aureus* infection, and renal calculus were made. But the blood count, blood cultures, and blood chemistry were negative. Repeated stains of urine sediment and inoculations of guinea pigs with the urine failed to support the idea of renal tuberculosis. The plain x-ray plate of the kidneys revealed no evidence of calculus nor of any other kidney abnormality. The phthalin excretion was normal. At this stage, I was asked to see the patient about the middle of October, 1923. I at once undertook a thorough cystoscopic study of the bladder and right urinary tract. This showed a perfectly normal bladder, bloody urine from the right side, and a definite narrowing at the bladder end of the right ureter; but no evidence of calculus, sterile urine from the right kidney, a renal pelvis of normal capacity, and a normal pyelogram. I, therefore, advised periodic dilatation of the right ureter. The patient was strongly opposed to this idea, however, and she continued on the medical service, presenting a continuance of the same symptoms and signs until she was discharged on November 11, 1923. Three weeks later she was admitted for the third time to the medical service, having had four sharp attacks of right-sided renal colic, followed by the passage of claret colored urine. Finally, on December 17, 1923, she was transferred to the gynecologic service, under my care with a recommendation of right kidney exploration. I fully concurred in the advisability of this course; but, feeling that exploration might reveal an indication for nephrectomy, I decided first to investigate the left urinary tract, in spite of the fact that at no time had it been under suspicion. At intervals of from ten days to two weeks, four successive attempts were made—the final one under general anesthesia—to pass renal catheters, bougies, whale-bone filiforms, and flexible metal sounds of varying sizes up the left ureter. Invariably each attempt failed, owing to the fact that an impassable stricture was encountered 2 cm. above the ureteral orifice, which was traversed by a channel so tortuous and narrow that it could not be successfully followed either by gentle or forcible manipulations. That a patent canal still existed, however, was shown by the spurt from the orifice at regular intervals of a fine jet of urine. It became necessary, therefore, to precede exploration of the right kidney by exploration and retrograde dilatation of the lower portion of the left ureter. On January 22, 1924, through an incision in the left lower abdominal quadrant, of the McBurney type, I exposed extraperitoneally the pelvic portion of the left ureter. It was encouraging to note that no evidence of hydroureter was present; but beginning at the point of its penetration through the basal portion of the broad ligament and continuing to the bladder wall, there was encountered an extraordinarily dense, cartilaginous-like, inflammatory process involving not only the ureter but also the periureteral sheath over a distance of approximately 3 cm. in continuity. A small longitudinal incision was made in the wall of the ureter just above the brim of the bony pelvis and a flexible blunt metal bougie passed down the lumen to the stricture area. Under guidance of the palpating fingers, it was then forcibly passed along the narrowed channel into the bladder and the entire stricture wall dilated. Exploration of the upper ureter by means of a bulbous catheter showed it to be normal. No attempt was made to close accurately the wound in the ureter. Only the periureteral tissues were lightly approximated over the opening and a drain introduced adjacent to this point, thus inviting a

temporary ureteral fistula. This promptly developed and with the free drainage of the left urinary tract thus established, a remarkably rapid improvement in the patient's general condition was noted. Three weeks after the operation trans-vesical catheterization of the left ureter was first attempted and successfully accomplished without much difficulty, the catheter being left *in situ* for four days to aid in reestablishing the normal channel and to promote closure of the fistula. This occurred five weeks after the operation. The stricture area was subsequently dilated twice and the patient discharged free from symptoms on March 9, 1924. She has since gained over twenty pounds in weight and for some months now has been carrying on her regular work in the training school. Since the operation on the left ureter she has experienced absolutely no recurrence of the renal attacks on the right side and has had no hematuria until about the middle of October when a very mild attack occurred. Prior to this, she refused to have further dilatations done, which I urgently advised. She has now consented, however, and the final stage of the cure is in progress. I wish to focus attention sharply upon the demonstrated pathology in the lower portion of the left ureter without symptoms referable to this side and upon the associated frequent attacks of right-sided renal colic and hematuria which promptly subsided upon reestablishment of proper drainage of the left side.

CASE 3.—In May, 1924, I saw in consultation at the Johns Hopkins Hospital, Mrs. L. J., a multipara, 43 years of age, upon whom a cystoscopic study was requested on account of a history strongly suggesting right-sided renal calculus. Twenty-three years previously her right kidney had been suspended. In June, 1920, she experienced her first attack of renal colic on the right side, which was of short duration and mild in character. No hematuria followed the attack and she was not conscious of having passed a stone. Subsequently she had frequent discomfort in the right lumbar region which became gradually worse until the end of the summer of 1923, when it had become severe enough materially to restrict her activities. After a period of rest in bed, she went on a Mediterranean cruise extending over several months, but each excursion ashore was followed by a sharp attack of renal colic on the right side, associated with chills, fever, and hematuria. She returned to New York early in May, 1924, and came at once to the Johns Hopkins Hospital, having been confined to bed during the previous month.

The general physical examination disclosed nothing of significance, except a right kidney approximately fifty per cent larger than normal, which was slightly tender. The x-ray, however revealed not only an unusually large right kidney but also a sharply outlined shadow, which was diagnosed stone in the right ureter just below the kidney pelvis. The phthalein excretion was normal. On May 12, I made my first cystoscopic examination. The bladder and ureteral orifice were normal. The right ureter was easily catheterized with a No. 8 renal catheter, carrying a wax tip, which passed to the kidney pelvis without meeting obstruction. The urine from this side was negative both microscopically and bacteriologically. The maximum capacity of the renal pelvis was only 4 c.c, which was surprising in view of the large size of the kidney. On removing the catheter the wax tip was unscratched. One week later, I catheterized both ureters, using a bismuth catheter on the right side. The differential phthalein test showed both kidneys to be functioning normally; but the pyelogram on the right side showed the stone shadow to be outside the ureter and a small but normal kidney pelvis situated well up on the upper half of the kidney shadow. I thereupon made a tentative diagnosis of double renal pelvis and double ureter, with a stone incarcerated at the ureteropelvic junction of the lower one. One week later, I made an attempt to demonstrate the lower pelvis by first filling the upper one and then



partly withdrawing the catheter and attempting to fill the lower one; but this was unsuccessful, the pyelogram again showing only the upper pelvis. Since only a single ureteral orifice could be found on the right side and the catheter invariably passed to the upper pelvis, further information could be gained only by exploration. This was undertaken on May 29, 1924. The kidney was exposed through the usual oblique lumbar incision. It was found to be fully fifty per cent larger than normal. After releasing dense adhesions to its dorsal and lateral surfaces, which resulted from the old suspension operation, the organ was with some difficulty delivered into the wound. On approaching its mesial border, an extensive inflammatory reaction was encountered and while separating the adherent fatty capsule, there occurred a sudden gush of clear fluid, which proved to be an extravasation of bromide solution and urine through a perforation in the upper pelvis. The adjacent tissues were edematous, discolored and unhealthy looking. Further dissection revealed the anticipated congenital anomaly of a double pelvis and double ureter. Incarcerated in the lower ureter and held fast by a sharply defined stricture at the ureteropelvic junction was a calculus, approximately 1 cm. in diameter. The two ureters were followed down a distance of 12 to 15 cm., but the point of their union was not accessible. A nephrectomy was done and the wound closed in the usual manner. The patient's convalescence was rapid and uneventful. Examination of the kidney after removal showed that the primary lesion was stricture of the lower ureter. This was complicated by an incarcerated calculus, by the congenital anomaly of double renal pelvis and double ureter, and by a marked perirenal inflammatory reaction.

In conclusion, I wish to point out that these cases furnish an actual demonstration of three types of ureteral stricture. The first was of traumatic origin, and was complicated by an ureterovaginal fistula; but the kidney was saved by successfully combining a plastic operation with proper dilatation of the stricture area. The second case illustrates the common type of inflammatory stricture in aggravated form, involving the lower ureteral segments and presenting the interesting clinical picture of recurrent attacks of renal colic on the side with scarcely perceptible damage to the urinary tract. Here again cure was effected by proper dilatation of the stricture areas. The third case presented a puzzling diagnostic problem, which happily was solved prior to the operation. It illustrates, in addition to the interesting congenital anomaly, an inflammatory stricture at the ureteropelvic junction, which led to the formation and incarceration of an ureteral calculus and associated pathology requiring nephrectomy. The demonstration of ureteral stricture in each instance as pathologic entity is absolute.

*(For discussion, see p. 721.)*

## PSEUDOCARTILAGINOUS CYST OF THE OVARY\*

BY WM. EDGAR DARNALL, A.M., M.D., F.A.C.S., ATLANTIC CITY, N. J.

MY only apology for reporting this case is the unusual character of the pathology of the tumor removed from B. J., aged sixty-eight, a mulatto woman who was sent into the wards of the Atlantic City Hospital. Her mother died of typhoid fever, her father of paralysis. Her own clinical history was negative. She did not remember having been sick. She had had three children, no miscarriages but had always suffered more or less from leucorrhea. Her menses appeared at the age of twelve, were always regular, every twenty-eight days, lasting three days and without pain. She slept well, appetite good but digestion poor. There was a trace of albumin in the urine, no casts but about 40 leucocytes to the field. The kidney function on admission was 21 per cent (phthalein test), otherwise the urine was normal. The blood showed hemoglobin 70 per cent, color index 0.8, red cells 4,020,000, white cells 9,300, polymorphonuclears 72 per cent and a faintly positive Wassermann 1+. Blood urea 27.3.

The vaginal outlet was normal, cervix atrophied, uterus small. There was a mass in the lower right quadrant and the woman complained of severe pain in this region. The temperature and pulse were normal. Operation revealed a right ovarian cyst about the size of a coconut, partly twisted on its pedicle. There were many daughter cysts of varying sizes and of more or less yellowish color. The left ovary appeared normal, the appendix kinked and involved in adhesions.

The cyst was removed as well as the appendix. The walls of this cyst in many places were quite thin, not more than 0.2 cm.; at other places the thickness reached 2 cm. These thickened areas consist of fibrous tissue along with cartilaginous or almost bony tissue very difficult to cut, giving a rough sensation to the knife as if calcified. They reminded one, in elasticity and hardness, very much of a fetal head of three or four months' and when cut showed spicules of hardened tissue similar to cartilaginous bone. The lining of the cyst inside was quite smooth. A few trabeculae were present running from one part of the side of the cyst to the other, otherwise the inside of the cyst was smooth. The cyst wall consisted equally of the thin and the thick structures as mentioned. Along with the thickened areas were found many smaller cysts from the size of a cherry seed to that of a pigeon egg. The inside lining of some of these smaller cysts was roughened

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and hard and felt like true bony tissue. The content of the cyst was brownish in color. There were no organisms found and there were no elements of a dermoid character.

Dr. John A. Kolmer, of Philadelphia, reported that "The cyst shows the histologic structure of a fibromyxocyst adenoma of the ovary without malignancy. The tube attached shows a chronic nontubercular salpingitis."

The specimen was studied in more detail by W. M. L. Coplin of Philadelphia, who reports as follows:

The following histologic report is based on the study of seven slides embracing thirteen sections from different and various parts of the gross specimen, examined after appropriate fixation, paraffin infiltration, cutting, and suitable staining:—

For purposes of description the following may be designated:—

- (a) The septal, sustentacular or intercystic tissues.
- (b) The lining of the cyst cavities.
- (c) Attached fragments of cyst contents.

(a) The septal, sustentacular or intercystic tissues. These, for the most part are composed of collagenous elements, mostly fibrous but also containing what appear to be a few strands of elastica. The fibrous tissue is mostly of coarse strands of fully developed elements but finer fibers and fibroblastic cells are also present. A few fibers of unstriped muscle have also been encountered. In some of the septa notable separation of bands, vacuolated areas and hydropic cells suggest an associated edema not, however, intense. Hemorrhages, both recent and old, are also present; some of the former contain fibrin and erythrocytes in various stages of disintegration; the older hemorrhages contain pigment, and manifest absorption and fibrous replacement are in progress. One of the more recent bleedings has extended into a cyst cavity forming a clotlike stratum flattened against the cyst wall.

At one point in the interstitial tissue, immediately adjacent to an adenomatous collection forming a part of the lining membrane, collections of cells believed to be epithelium, apparently morphologically identical with those cells lining some of the smaller cysts, are growing independently of surface attachment. This is interpreted as an evidence of a tendency to lawless invasion of the connective tissue and, therefore, as potentially, if not actually, carcinomatous. The change has been sought in all sections but encountered in only one; even there it cannot be said to be indubitably cancerous, although this inference appears justified.

At one point the interstitial structures are granular, possibly necrotic with suggestion of calcification, although lime salts have not been demonstrated histologically.

In the septa also are the blood vessels, some of which are of considerable size. An artery shows very notable, even advanced sclerosis and one sclerotic vessel contains a small organizing, occluding thrombus evidently of recent formation.

(b) Lining of the cyst cavities: Some process, possibly atrophy, necrosis, trauma or other, has removed any lining epithelium that, at one time, may have been present in some of the cysts. At points, however, in the larger cysts and more abundantly in the smaller ones, residual cells are clearly demonstrable; these are commonly of the low columnar or cuboidal type, frequently flattened, staining badly and almost, if not quite, necrotic. At one point epithelial growth and gland-like arrangement of the new elements are in progress. Here the cells stain deeply and the inference that the process is active and progressive may be

justified. It is just at this place that the possible invasion of the deeper (intercystic) structures, mentioned above, is demonstrable.

(c) Attached fragments of cyst contents. To some of the walls of larger cysts attached fragments of what may be construed as residual contents of the cysts can be recognized. These fragments are, in some instances, hyalin or homogenous, suggesting colloid; again the attached matter is clearly blood or apparently of blood origin,—a residue of some past hemorrhage. Polymorphonuclear leucocytes or other evidence of infection and suppuration have not been encountered.

*Diagnosis and remarks:*—Clearly the mass is a multilocular cystadenoma showing evidence of interstitial inflammation and repair, and, because of the extravasated blood, has possibly been subjected to some minor trauma. Adenomatous growth and extension are obvious and it is possible, indeed probable, that an early stage of definitely malignant transformation is in progress. Papillary hyperplasia has been sought for but not demonstrated; in one of the cysts what was thought to have been a papillary growth was, on histologic examination, found to be blood, disintegrating and necrosing on the aspect facing the cavity and possibly organizing where attached to the cyst wall.

5 SOUTH MORRIS AVENUE.

(For discussion, see p. 710.)

## RUPTURE OF THE UTERUS, WITH A REPORT OF TWO CASES WITH RECOVERY FOLLOWING HYSTERECTOMY\*

BY JAMES KNIGHT QUIGLEY, M.D., F.A.C.S., ROCHESTER, N. Y.

**R**UPTURE of the uterus occurs about once in a thousand cases of pregnancy. The prognosis is always grave. In the complete form before the advent of modern surgery the mortality was probably at least 90 per cent and even today it has been given as high as 70 per cent for complete rupture and 25 per cent for the incomplete form, with a fetal death rate of 85 to 90 per cent. The prognosis is dependent upon the extent of the tear, the amount of manipulation that preceded it, the prompt availability of good surgical care including adequate hospital facilities, the length of time that elapses between the rupture and the use of appropriate treatment.

Prophylaxis is the best treatment, for prompt conservative delivery in a case of beginning contraction ring dystocia will prevent many ruptures. One should wait for or secure full cervical dilatation before any attempt is made at delivery, and not attempt version in a uterus with a thinned-out lower segment with some retraction of Bandl's ring. One should be very careful in the use of pituitary extracts before the termination of the second stage of labor. While the dictum "once a cesarean always a cesarean," may not meet with universal favor, nevertheless, the 5 per cent proportion of uterine rupture as

\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

against the very low mortality in elective section today, leads me to be very reluctant to subject any uterine scar to labor. With the increasingly large number of low cervical sections done, we will probably see fewer postcesarean ruptures.

The treatment of incomplete ruptures in which the hemorrhage is often limited and where delivery is already effected is easy to outline. Morphine, ice-bags, ergot, perhaps packing with gauze is used, with transfusion if necessary. These cases, particularly if a large arterial branch is involved, will sometimes improve only to have more hem-

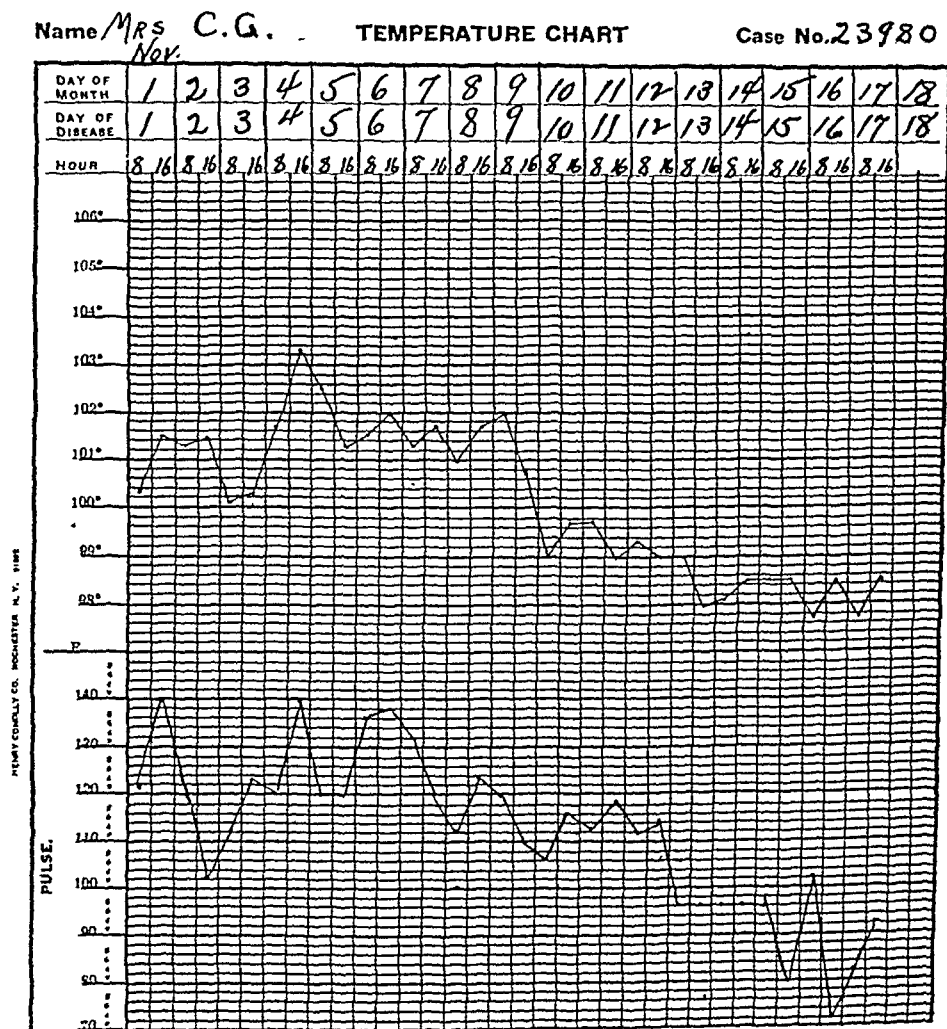


Chart 1.

orrhage, perhaps after days. Laparotomy in the interval after a transfusion may be necessary. Some of the ruptures extending upward from the cervix can be repaired by suture from below. In the complete variety, the so-called tragic case, the treatment depends upon the condition of the patient. If after blood pressure and hemoglobin determination, it seems that a laparotomy is justifiable, then transfuse, open the abdomen, deliver the baby from the abdomen or uterus, and if there is no reason to suspect infection and the rent is not too ex-

tensive or its edges too ragged to preclude good repair, close by two layers of sutures; if because of frequent examinations or attempts at delivery the case is under suspicion, remove the uterus as rapidly as possible.

Tweedy and Wrench of the Rotunda deprecate laparotomy in cases of complete rupture. They advise delivery of the child from below even though it is necessary to deliver through the rent in the uterus. Following delivery they loosely pack with gauze the rupture in the uterus. To attempt breech delivery from a uterus already ruptured

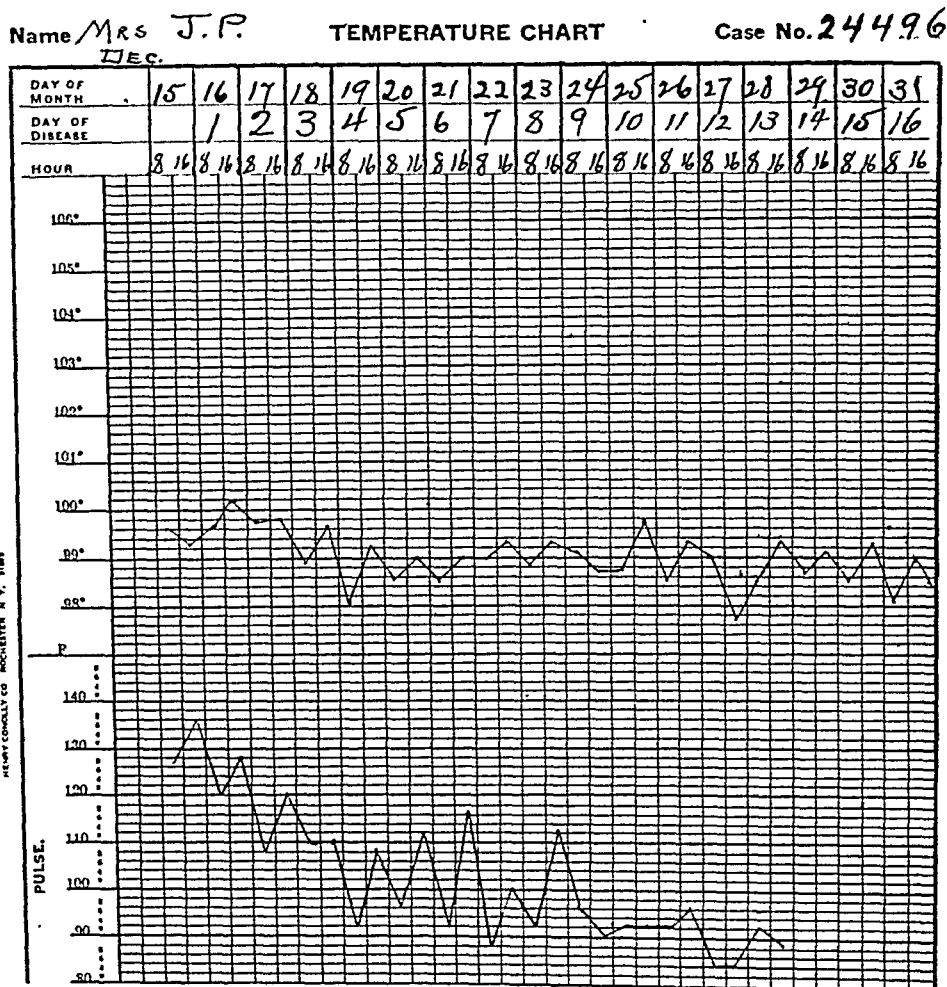


Chart 2.

seems illogical, the rent may be enlarged and the uterine artery torn, to say nothing of prolapse of bowel; again, if it is sometimes difficult to control postpartum hemorrhage by tight intrauterine tamponade, is it possible to stop bleeding from torn vessels by a light pack where counterpressure is not operative? Berkeley and Bonney of London, however, recommend for a complete rupture, that is, one involving the peritoneum, an immediate laparotomy, with suture of the uterus if possible, if not, hysterectomy. Most American obstetric surgeons recommend this course.

## CASE REPORTS

CASE 1.—Mrs. C. G., Rochester General Hospital, admitted 11:20 P.M., October 31, 1923, Italian by birth, thirty-two years of age. She has lived in the United States eleven years; has been married nine years and has had eight pregnancies. She says she has never been ill.

Obstetric history: This was her eighth pregnancy, four having terminated prematurely at two, three, four and six months from causes not known; of the three fullterm pregnancies, the first terminated in a forceps delivery with a still-born child, the second was a normal spontaneous delivery of a living baby, the third full term pregnancy also resulted in a living child after a short easy labor.

The present pregnancy was uneventful, the patient was supposed to be at full term though she did not menstruate between her last two pregnancies. Labor had been in progress about twenty-seven hours on admission. After having had pains sixteen hours, she was seen by her physician who, having assured her everything was all right, went away, and returned eight hours later and gave her a hypodermic. As no progress was noted, he attempted forceps delivery and after failing, sent her to a hospital.

When admitted the patient was in severe and almost continuous pain, the abdomen was very hard and there were two distinct tumors present, the lower one reaching to about two finger breadths below the umbilicus. The fetal heart was not heard. (A good description of a retracted Bandl's ring quoted from interne's notes.) Vaginal examination showed the cervix fully dilated and the vertex presenting in the L. O. P. with no engagement and general condition good. The pulse was 84, regular and of good quality. When seen by the writer about twenty-five minutes later the patient presented an entirely different picture—the skin was pale, cold, perspiring, pulse 120; abdomen with doughy feel, no contraction ring felt, no presenting part was felt on vaginal examination. There was slight external bleeding. The patient was prepared for operation. She was given 800 c.c. of normal saline intravenously, and during the operation 450 c.c. of citrated blood. Upon opening the abdomen there was a gush of blood and the baby was found free in the abdominal cavity. It weighed nine and one-quarter pounds and was delivered with the placenta. The uterus was well contracted and practically empty, the rent was a transverse one in anterior surface of the lower uterine segment. A supravaginal hysterectomy was done and one tube was inserted for drainage. The patient's condition was desperate throughout the operation, with a pulse rate of 144 to 156 and of poor quality.

At 8:40 A.M., seven hours after, the patient's condition was poor, the pulse irregular and its rate was 144. The blood pressure was 118/80 and there was slight cyanosis. Twelve hours later the pulse was of much better quality (116 to 120) but the patient breathed heavily and many moist râles were heard over both sides of the chest. Three hundred c.c. of citrated blood were given intravenously. For the next week she had a rather stormy time with a bronchopneumonia but presented no abdominal or pelvic complications whatever and was discharged on the twenty-fifth day.

Salient points in this case:

1. A worn-out uterus.
2. Persistent posterior position, responsible jointly with pituitrin for a contraction ring dystocia.
3. The value of transfusion preparatory to or during the operation.

CASE 2.—Mrs. J. P., Rochester General Hospital, admitted 9:30 P.M., December 15, 1923. Italian, forty-two years of age. General personal history irrelevant and an obstetric history of the first five pregnancies being normal, terminating in

spontaneous deliveries; sixth complicated by placenta previa for which an abdominal delivery was done in this hospital in 1917.

Two years later in her seventh labor she summoned a physician who, finding full dilatation and a head low in the pelvis, delivered by low forceps. During the present, or eighth, pregnancy she says she has felt perfectly well and does not remember the date of her last menstruation but estimates she is at term. Her pain began about 6:30 P.M. the night of admission to the hospital. She had had no prenatal attention and called a physician after the onset of labor. He responded in a short time and found that pains were of about ten minute intervals. He left and returned in two hours and then made a vaginal examination and found two fingers dilatation and the vertex L. O. A. position. During the visit the physician said the patient had two cyanotic spells and because of this he sent her to the hospital.

On admission to the hospital three hours after the onset of labor, the patient was very pale, dyspneic, and asking for water. Very restless and tossing about. The lungs showed a few moist râles over the base. The heart was very irregular (100 at first but rapidly increasing to 120). The blood pressure was 50/32 at first but one-half hour later it was 92/50. At times the radial pulse was imperceptible. There were no cardiac murmurs. The abdomen was soft and doughy. The uterine contractions were not felt. Vaginal examination showed bleeding from the vagina which was bright and too brisk for antepartum bleeding. The cervix was dilated but no presenting part was felt. A diagnosis of ruptured uterus was made. The patient was immediately prepared for operation. One ampule of digitan was given intravenously. Four hundred c.c. of the husband's citrated blood were transfused during the operation. A midline incision from the umbilicus to the pubis was made and considerable blood was found on opening the peritoneum. The placenta presented in the abdominal wound and was delivered. The dead infant weighed eight pounds and two ounces and was free in the abdominal cavity.

The uterus was quite low and contracted but was not bleeding actively. There was a ragged gaping wound in the upper segment of the uterus at the site of a cesarean scar. A supravaginal hysterectomy was done using clamps. A tube with wick drainage was placed in the wound. The postoperative condition was unusually free of symptoms. The blood count on the day following operation was: reds 2,390,000, leucocytes 16,500, hemoglobin 32 per cent. Two days later the patient was given 250 c.c. of blood. She was allowed out of bed on the fifteenth day and was discharged on the eighteenth day. The second case illustrates the fallacy that though a sectioned uterus may go through one or more labors safely it will always go through another.

These patients were unusually free from vomiting, distention or indication of infection which leads the writer to believe that the large involuting uterus is quite a factor in a smooth convalescence. The value of transfusion was demonstrated in both cases. Hysterectomy was done in the first case because delivery had been attempted and a probable fatal sepsis would have followed an attempt to conserve it. Hysterectomy was done in the second case because of the nature of the wound in the uterus and the difficulty in securing a good scar. Both cases presented contracted uteri which leads one to believe that the prognosis of uterine rupture is better when the organ empties itself entirely into the uterine cavity.

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## THE SHORT UMBILICAL CORD AS A FACTOR IN DYSTOCIA\*

BY THEODORE W. ADAMS, M.D., PORTLAND, OREGON

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IN REVIEWING obstetric literature for the past twenty years one is struck by the number of cases reported, wherein dystocia or fetal asphyxia is attributed to the shortness of the umbilical cord. That such a complication may and does occur cannot be denied. However, looking at this condition as it is met in the daily run of obstetrics, one is not convinced that it is an important factor in either dystocia or fetal asphyxia.

It was, therefore, decided to study the case records of the Maternity Clinic of the University of Michigan Hospital in an attempt to obtain further information as to the effect of a shortened cord on labor. The study embraces 604 consecutive deliveries in which pregnancy had advanced beyond the age of viability. There were 112 cases (16.9 per cent) where the cord was either actually short or coils of cord were present around the fetus. For the purpose of comparison 187 vertex deliveries where no coils existed and where the cord was of normal length were also studied.

The average length of the cord has been found to vary from 34 to 48 cm. as given by Nägele<sup>4</sup> to 50 to 60 cm. as recorded by Lariot.<sup>3</sup> von Winkle<sup>7</sup> in his *Handbuch der Geburtshilfe* states that in general the length of the umbilical cord is approximately equal to the length of the fetus. That is, for a full term fetus the length of the cord would be about 50 cm.

Mathematically Gardner<sup>2</sup> has shown that for a normal full term child to be born without any traction on the umbilical cord, the latter must measure at least 32 cm. He arrived at this conclusion by measuring the distance from the vulva to the fundus. This distance he found to be 32 cm., while Tarnier's figure for the same distance is 35 cm. However, the slack in the cord is not taken up until the umbilicus is passing through the vulva. The fundus at this time has descended somewhat so that the vulvofundal distance is 28 cm. In a small series of cases at the University Maternity Ward where these measurements were taken, the figures coincided closely with those of Gardner. Of course, as pointed out by von Winkle, it makes an appreciable difference in the length of the cord necessary if the placenta is implanted below the fundus of the uterus.

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On the other hand a cord measuring over 28 cm. might be so coiled about the fetus as to materially shorten its available length. The average distance from the umbilicus around the neck and back to the umbilicus of a full term child averages 34.5 cm. Thus a cord which is looped once around the neck would have to be 62.5 cm. to give an available length of 28 cm. Were there a coil around the neck in addition to the loop another 17 cm. or the average circumference of the neck, would have to be added, making a total length of 79.5 cm. The cord less than 28 cm. with or without coils has been termed an actually short cord, while a cord so looped or coiled about the fetus as to make its available length less than 28 cm. is classed as an accidentally short cord.

Of the 112 cases of shortened cord there were 4, or 0.7 per cent, which fell into the group of actually short cord. These cords measured 17, 22, 27, and 27 cm. There were 108 cases or 16.2 per cent where there was at least one coil of cord about the fetus. However, 44 of these cords were of sufficient length to give an available length of 28 cm. despite the coils around the fetus. There were, therefore, only 68 or 11 per cent of cases where the cord was sufficiently short theoretically to cause dystocia.

Of the cases of accidentally shortened cord there were 44 instances (68.7 per cent) where there was one loop of cord around the neck, 17 (26.5 per cent) where two loops were present, and in three cases (4.7 per cent) there were three coils around the neck. The average length of the cords when one coil was present was 52 cm. or 10.5 cm. less than theoretically would be required to allow birth to take place without traction on the cord, were the placenta implanted on the fundus of the uterus. In the cases where two or three coils were present the average length of the cords was 61 and 87 cm. respectively. That is, in the former cases the cords were theoretically 18.5 cm. and in the latter 11.5 cm. too short to allow birth to take place without dystocia.

If dystocia were to take place, one would naturally expect that it would occur during the second stage of labor as it is at this time that the short cord would interfere with the expulsion of the child. The length of the second stage in this type of case should, therefore, be prolonged. This, however, was not the case. The average length of the various stages of labor in cases of shortened cord as compared with those in which the cord was of normal length is shown in Table I.

The total length of labor for primiparae was 14.3 hours in normal cases as compared with 13.3 in cases with short cords. The second stage or the stage where the greatest effect of the short cord would be expected was 1.9 hours in both types of cases in primiparae while in multiparae the second stage was 12 minutes less in those cases where the cord was shortened. In this series of cases a short cord did not lengthen either the second stage or the total length of labor.

TABLE I  
COMPARATIVE LENGTHS OF LABOR

	CASES WITHOUT SHORT CORD (187 CASES)				CASES WITH SHORT CORD (68 CASES)			
	168 Cases				62 Cases			
	1st Stage Hr.	2nd Stage Hr.	3rd Stage Min.	Total Hr.	1st Stage Hr.	2nd Stage Hr.	3rd Stage Min.	Total Hr.
Spontaneous Deliveries								
Primiparae	12.2	1.9	13	14.3	11.3	1.9	15	13.3
Multiparae	5.8	1.0	16	7.0	8.3	0.8	12	9.3
Forceps Deliveries	20 Cases				6 Cases			
Primiparae	28.0	3.5	14	31.7	29.8	3.0	6	31.7
Multiparae	16.0	4.5	10	20.0	29.0	2.0	9	31.2

There were nine cases of theoretically short cord in which the length of the second stage was over three hours. Six of these had definitely funnel pelves of sufficiently severity to account for the second stage dystocia. There were then only three cases (0.2 per cent) out of 604 consecutive deliveries where the short cord may have been the etiologic factor in prolonging the second stage.

Were short cords capable of hindering advance in the second stage, it might readily be expected that the percentage of operative deliveries would be higher in this type of case. This seems logical because there is no reason to believe that other factors leading to forceps extraction, such as contracted pelves or posterior positions, would not be found just as frequently among cases of short cord as with cords of normal length. There would be then all the indications for operative delivery common to both types of cases plus the dystocia due to the shortened cord.

In the present series of 68 cases of short cord, forceps deliveries were indicated in 8.3 per cent of cases, while in 187 vertex cases without short cord, operative delivery by forceps was indicated in 10.7 per cent of cases. Short cord did not increase the percentage of operative deliveries.

The danger with which a short cord would be expected to threaten the child would be either asphyxiation due to impairment of the fetal circulation, or hemorrhage from a rupture of the cord. Rupture of the cord, as pointed out by Stowe,<sup>5</sup> occurs as the result of a sudden jerk far more frequently than as the result of the gradual pressure exerted by the uterine contractions. In the present series there was no instance in which rupture occurred. The effect on the fetal circulation can best be obtained by a comparison with the cases in which there was no shortening of the cord. Table II gives this comparison. In 68 cases of shortened cord the fetus was stillborn in 2.9 per cent of cases, showed evidence of livid asphyxia as described by Williams<sup>6</sup> in 13.3 per cent, and was perfectly normal at birth in 83.8 per cent. In each of the two cases of stillbirth there was no fetal heart heard on

entrance to the clinic early in labor. One was a premature birth at seven and one-half to eight months and showed quite definite placental infarction. It is possible in the other case that the coil of cord around the neck in some way embarrassed the fetal circulation sufficiently to cause death. However, the birth in this case was spontaneous and the cord did not seem to offer either traction or obstruction. As compared to this, in 187 cases of vertex presentation in which the cord was not short, the fetus was stillborn in 4.8 per cent, showed livid asphyxia in 14.9 per cent, and was normal in 80.3 per cent. That is, the fetal mortality and morbidity rate was no greater in cases of shortened cord than in cases where the cord was of normal length.

TABLE II. COMPARATIVE MORTALITY OF FETUS

	STILLBORN		LIVID ASPHYXIA		NORMAL	
	No. of Cases	Per Cent	No. of Cases	Per Cent	No. of Cases	Per Cent
Cases with short cord (68 cases)	2	2.9	9	13.3	57	83.8
Cases without short cord (187 cases)	9	4.8	28	14.9	150	80.3

The greatest danger to the mother lies in the constant tension to which the placental surface is subjected, thus tending to cause a partial premature separation of the placenta. The average loss of blood in 147 vertex presentations with normal length cords was 288 c.c., as compared with an average loss of 568 c.c. in 68 cases where the cord was short, or the average amount of blood lost was almost twice as great in cases where the cord was short.

Williams<sup>6</sup> places the lower limit of what may be considered a post-partum hemorrhage at 600 c.c. In this series a loss of more than 600 c.c. occurred 12 times, or 17.2 per cent, in the cases of short cord. In 147 cases of normal length cords, bleeding to the excess of 600 c.c. occurred 7 times, or 4.8 per cent. However, there was no maternal mortality and although this is a danger which must be taken into consideration it does not mean that, except in the exceptional case, it is an indication for operative interference.

By the foregoing statements it is not meant that a short umbilical cannot, rarely, be the cause of serious dystocia. A casual review of the literature will quickly convince one that such cases do, occasionally, occur. However, they are rare. In by far the greater majority of cases a short cord causes neither dystocia nor danger to the fetus or mother; and although this condition exists as a potentially dangerous complication, it only rarely necessitates operative interference.

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- <sup>6</sup>Williams: Text-book of Obst., 1923, ed. 5, New York, pp. 940, 969, D. Appleton and Co.
- <sup>7</sup>von Winkle: Handbuch der Geburtshülfe, 1903, i, Part I, p. 300.

## A NEW UTERINE CANNULA FOR USE IN THE RUBIN TEST

BY ERNEST GLADSTONE, M.D., NEW YORK, N. Y.

THIS cannula was devised to take the place of the Keyes-Ultzmann cannula in the Rubin apparatus for tubal insufflation in sterility.

The cannula (Fig. 1) is 10 inches long and is made of nickel plated brass. The end that is inserted into the uterus coincides with the curve of the cervical canal and is perforated at the tip by several small apertures. The handle of the instrument is bent down (*C*) at an angle of  $45^{\circ}$ , has a stopcock inserted (*B*) and terminates in a nipple (*A*) for attaching the rubber outlet tubing of the flow-volumeter. A rubber urethral tip (*E*) is fitted over the cannula and is held secure, in any desired place, by a metal cylindrical stop (*D*).

Diagrams Nos. 1, 2, and 3 show horizontal sections of the stopcock, in the three possible positions of the handle. These sections also point

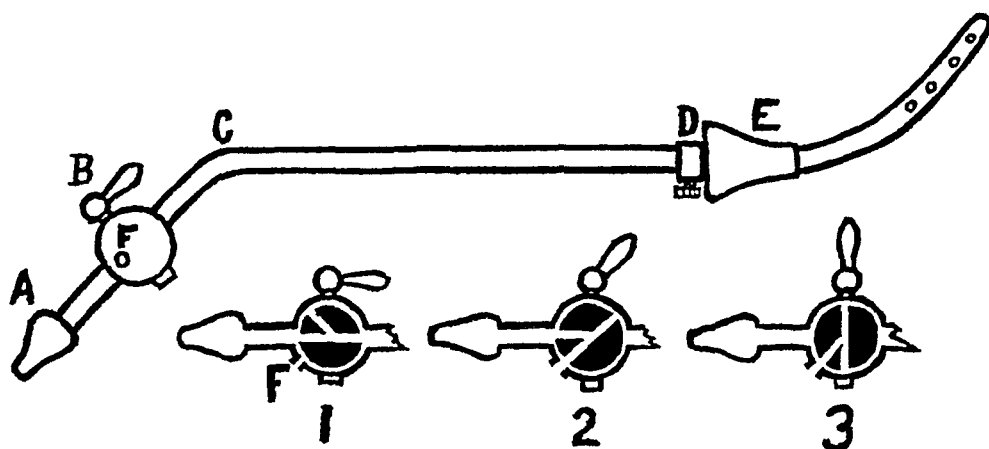


Fig. 1.

out the two channels of the valve of the stopcock: a long one running the whole length of the valve and a shorter one joining it at the center, at an angle of  $45^{\circ}$ . It also shows that the housing of the valve has a small opening (*F*) on the side. When the handle of the stopcock is in position No. 1, the flow of gas is directed through the long channel into the cannula; in No. 2, the gas escapes through the opening (*F*); and in No. 3, the flow of gas is shut off.

My technic for insufflating the tubes is as follows: The cannula is attached to the rubber tubing connected with the outlet of the flow-volumeter of the Rubin apparatus. The rubber tip is moved to the desired distance from the end and secured in this position by the stop. The flow of gas is started and to regulate the rate of flow the stopcock is turned to No. 3. When the rate of flow has been regulated, the stopcock is turned to No. 2, and the cannula is introduced into the uterus.

The stopcock is then turned to No. 1, in which position the gas flows into the uterus. To interrupt the flow of gas, at any time, the stopcock is turned back to No. 3.

To summarize the advantages of this cannula:

1. By replacing the valve in the outlet tubing with this simple stopcock arrangement, we do away with two rubber tube connections and lessen the possibility of leakage.

2. As the stopcock can be regulated by the index finger of the hand holding the cannula, the operator does not have to take his eyes from the field of operation.

3. The rate of flow is easily determined by the aid of the stopcock.

4. The handle, being bent, allows a clear view through the speculum, as the hand holding the instrument does not obstruct the view, which is the case in a straight handle cannula.

5. The adjustable stop prevents the rubber tip from slipping so that the cannula cannot go into the uterine cavity farther than intended.

6. The use of this cannula makes the technic so simple that the test can be made by one person without an assistant.

327 EAST EIGHTEENTH STREET.

# Department of Maternal Welfare

## PROVISIONS FOR MATERNITY CARE IN THE UNITED STATES\*

BY CAROLYN CONANT VAN BLARCOM, R.N., NEW YORK, N. Y.

A DISCUSSION of provisions for maternity care in the United States seems to divide itself, logically, under the following headings:

*First.*—Our status in terms of our maternal mortality.

*Second.*—The possible bearing upon this mortality of the numerous and varied nationalities in this country and the distribution of population.

*Third.*—The means, (outside of private practice) through which the medical profession gives or directs maternity care, these being chiefly: (a) Hospitals, (b) Organizations other than hospitals such as the government appropriation, maternity centers, prenatal clinics, health centers, etc., (c) Public health nurses, and (d) Midwives.

*Fourth.*—The general results of the above work, the trend and further needs.

### MATERNAL MORTALITY

In the matter of maternal mortality, the United States makes a poor showing. Childbirth still stands next to tuberculosis as a cause of death among women fifteen to forty-four years of age. Among twenty-two countries giving information, only two, Belgium and Chili, have a higher maternal death rate than we. Our maternal deaths have actually tended to increase, rather than decrease, during the past quarter of a century. In the death registration area, in 1900, the rate per 100,000 population was 13.4; in 1922, 15.6. Somewhat more reliable figures than these, though covering a shorter period, are the following rates per 1,000 live births in the birth registration area from the date of its establishment, in 1915 to 1923:

Deaths per 1,000 live births in the birth registration area, 1915 to 1923.

	1915	1916	1917	1918	1919	1920	1921	1922	1923
All puerperal causes	6.1	6.2	6.6	9.2	7.4	8.0	6.8	6.6	6.7
Puerperal septicemia	2.4	2.5	2.7	2.5	2.5	2.7	2.7	2.4	2.5
All other puerperal causes	3.7	3.7	3.9	6.6	4.9	5.3	4.1	4.2	4.1

In 1921, when the rate was 6.8, there was a total of 18,280 maternal deaths or one mother lost for every 147 babies born. A very large proportion of all these deaths have been from preventable causes. This in spite of the fact that in no country is there to be found better obstetric work, better teaching of medical students and nurses or better results among patients under good care. Evidently an explanation of this paradox would get at the root of our problem.

\*Based upon a paper read before the "Third English Speaking Conference on Infant Welfare," Caxton Hall, London, England, July 3, 1924, and read at a meeting of the Section of Obstetrics and Gynecology, New York Academy of Medicine, January 27, 1925.



## NATIONALITIES AND DISTRIBUTION OF POPULATION

As to nationalities, practically every nation on the face of the globe is represented among the 110,000,000 inhabitants of the United States, the size of some of the larger groups being estimated as follows:

Negroes	10,463,131 (9.9%),	or practically 10% of the entire population.
German and Austrian	10,389,790 (9.9%),	" " 10% " " " "
Irish	4,136,395 (3.9%),	" " 4% " " " "
Russian	3,871,109 (3.7%),	" " 4% " " " "
Italian	3,336,941 (3.2%),	" " 3% " " " "

In round numbers, 30 per cent of the population of the United States is of foreign stock, which means that they are either foreign born themselves or of foreign born parentage. Add to this the 10 per cent of native born negroes and we have only about 60 per cent of the population composed of native white stock. There is a fallacious impression widely current, that New York is an American city. The fact is that it is a veritable Europe, Asia, and Africa all rolled in one. Eighty per cent of the city's population is foreign stock, being composed of something more than fifty nationalities. For example:

German	}	18.1%
Austrian		
Russian		17.5%
Italian		14.3%
Irish		11%

Many of the foreign groups establish communities patterned after their native towns, with churches, shops, theatres, and clubs preserving the customs, even dietaries of the fatherland. The result is that within the limits of one city one finds an almost endless variety of living conditions.

Advice upon matters of health and hygiene offered to people of such different habits and ideas is not likely to be acted upon uniformly. Accordingly, health education spreads slowly among the people who have migrated to America in body, but who, in spirit, abide by inherited traditions. On the other hand in such a city as London, where 95 per cent of the population is British, health teaching is given to people with so nearly the same inherited traditions that it may be expected to produce somewhat uniform response.

The differences in national background among our people seem to have a bearing upon our national maternal death rate. Among native born white women the death rate is 6.4 per 1,000 as compared with 10.8 per 1,000 among negroes. For mothers born in Ireland the rate is 9.1; Great Britain, 8.1; Canada, 7.9;

It is not entirely clear why there should be so much higher transplanted white women than the native born whites, but among risks of child bearing are increased by the prevalence of vener rachitic pelvis along with their poverty, ignorance, and generally.

But this diversity of peoples is not all. Apparently the dis inhabitants also has a bearing upon our maternal mortality. Vir large and many of the small cities are well supplied with efficiently conducted medical and relief agencies to promote the well-being of their inhabitants. Contrasted with these well equipped if crowded cities are great areas of sparsely settled plains, prairies, deserts, and mountain country where the nearest doctor is perhaps 100 miles away. In such a state as Texas, for example, covering nearly 266,000 square miles (more than twice as large territorially as England, Ireland, Scotland, and Wales)—there is one county of over 900 square miles with only 67 inhabitants, but the physical needs of these remote people are the same as among city dwellers.

In a backwater of civilization in the Southern mountains, there are 5,000,000 primitive people who live today under practically the same conditions that surrounded their colonial ancestors two or three hundred years ago. Very often their only mode of travel is by horseback over a narrow trail, or up the bed of a mountain stream. As medical protection of any kind is practically unknown in many of these districts, the women fare badly in childbirth. Their attendants may be untrained neighbors, friends, grandmothers, husbands, workmen, or perhaps there may be no one at all present.

Curiously enough, the only obtainable figures suggest that women in rural communities have a brighter prospect of living through childbirth than urban dwellers, the rates being 7.7 per 1,000 live births for cities and 5.9 for rural districts. The probabilities are however, that the apparently high rates in cities are largely due to more accurate certification of death in municipalities, and the fact that because of education and automobiles, complicated cases are frequently removed from outlying districts to hospitals in the cities. But notwithstanding these figures, the real evidence is that city mothers, in general, have better obstetric care than rural mothers and that isolation and inaccessibility constitute something of a menace to life and health of maternity patients.

#### FACILITIES FOR CARE

*Maternity Hospitals.*—Maternity hospitals perform the twofold service of offering facilities for the care of patients and the teaching of student doctors and nurses. So far as I am able to discover, a satisfactory scheme of work and teaching is carried out or attempted in most of the modern maternity hospitals and wards. Although it may be adjusted to the needs, size and facilities of different hospitals, the essentials are much the same the country over.

There is a growing tendency among women in cities to go to hospitals for delivery. In 36 of the largest cities from which information was obtained, a total of 56 per cent of the births occurred in hospitals. In San Francisco the proportion was 85 per cent; Minneapolis 62 per cent; Washington 56 per cent; Fort Wayne 52 per cent. A comparison of the extent of hospitalization in cities and rural communities is found in Maryland. In Baltimore, the one large city, 18 per cent of the births were in hospitals and only 4 per cent in the rest of the state.

*Maternity Organizations.*—It is common knowledge that for at least a quarter of a century the patients of high grade obstetricians have been given efficient care and have profited by it; but until fairly recently even the best obstetricians began their care late in pregnancy and high grade facilities were so limited that good care was accessible to only a small proportion of women; too small by far to affect the maternal mortality for the country as a whole. However, with increasing recognition of the value of complete prenatal care, started early, provisions for giving this care, under reliable auspices, have been devised. It is not possible to ascertain the number of hospital beds, throughout the country, available for maternity patients today, but we do know that the number of maternity hospitals, wards and dispensaries has increased steadily during recent years; and organizations, other than hospitals, have been established to provide or secure competent supervision and care from the beginning of pregnancy throughout the puerperium.

In order to standardize maternity service for the country at large the Washington and Regional Conferences on Child Welfare adopted, in 1919, certain minimum standards for public protection of the health of mothers. Maternity centers which follow all or part of the suggestions for prenatal care contained in these recommendations have increased steadily in number and scope the country

over. In some instances the organization is devoted solely to maternity service and in others maternity service forms a part of a general health program. An interesting development of organized prenatal work is under way at the *Brooklyn Maternity Center Association*. In addition to conducting free clinics, the Association provides prenatal care and instruction for women in moderate circumstances through its *Mothercraft Club* in which a small fee is charged for membership, and in cooperation with the Brooklyn Institute of Arts and Sciences, it has inaugurated a course of lectures on maternity and child care.

*Maternity and Infancy Act.*—An important factor in providing adequate maternity care throughout the entire country is a fund appropriated under the Sheppard-Towner Act of 1921, entitled *An Act for the Promotion of the Welfare and Hygiene of Maternity and Infancy*. This law was enacted as a result of the efforts and country-wide educational work of the Federal Children's Bureau strongly supported by individuals and groups of doctors, club women, social workers and the press. In all parts of the country the fund has given an impulse to official effort to provide or make available for all expectant mothers not in the care of private physicians, prenatal care, safe delivery and protection during the puerperium. On June 30, 1923, forty-one states were operating under the act, through official state bureaus. Although each state conducts its work to meet its own needs the general method employed by all is to stimulate local interest and initiative through education as to the value and feasibility of good maternity care, and to give temporary aid in establishing work to be maintained ultimately by local funds. Special effort is made to extend to rural communities the kind of service and facilities that have proved effective in urban districts.

Concerning the work itself we find that although there are health conferences or centers for infants and preschool children in 36 states, there are *maternity conference centers* in only 31. Evidently the importance of maternity care is not as widely appreciated as the value of child care.

The proportion of expectant mothers attending prenatal clinics in 22 cities giving figures for 1923 varied as follows: In only one city less than 1 per cent of the maternity patients had prenatal care: in five, from one to five per 100: in four cities, from five to ten per 100: in seven, from ten to fifteen; and in five cities more than 15 out of every 100 expectant mothers were under supervision. (Utica 15.5 per cent; Providence 15.6 per cent; Minneapolis 18 per cent; San Diego 26.1 per cent; New Haven 27 per cent.)

Official provision for safe delivery has not kept pace with prenatal work. It seems to follow in the wake of educational work along prenatal lines and at present is found in comparatively few states. In some states effort is made to help the doctors who deplore the difficulty of performing clean deliveries in isolated homes. The Divisions of Child Hygiene have prepared model obstetric packages containing the minimum supplies for a normal delivery at home. The supplies are made from materials obtainable at practically any retail store and may be prepared by any woman of average intelligence.

Official provision for adequate postnatal care is negligible. A few states are encouraging the establishment of bureaus through which domestic helpers may be obtained for a moderate wage by young mothers who are confined at home. This affords relief from anxiety and responsibility about meals and housework, thus insuring rest during the puerperium which would otherwise be impossible for many women.

*Public Health Nurses.*—In many cities, towns and rural communities where there are no maternity clinics, public health nurses manage to give prenatal supervision through one means or another,—always, of course, under medical direction. The National Organization for Public Health Nursing (1923) reports 206 volunteer

agencies, each employing more than three nurses, a total of 2704 nurses, giving prenatal service in 196 communities in 41 states. Some 2,000 volunteer agencies, each employing three or fewer nurses, either definitely offer prenatal nursing or will respond to requests from doctors for such service. The Organization states that prenatal nursing service is extending so rapidly, particularly in rural communities, that the newest figures available are always far behind the real situation.

*Midwives.*—Whether we are looking forward or backwards upon this question of provision for maternity care we cannot, with intelligence, ignore our so-called midwife problem—a situation, by the way, that is incomprehensible to Europeans. In all civilized countries, except the United States, the midwife is frankly acknowledged to be a factor inevitably operating for or against the welfare of mothers and babies. In their interests she is trained, licensed and restricted.

It is practically impossible to obtain exact information about the extent of midwives' work in America, but there are not far from 50,000 women, loosely described as midwives, attending perhaps 20 per cent of the births throughout the country. In certain New England states they are almost unknown, as in Vermont, where there are only seven all told. But in some sections, particularly the South, the magnitude of the problem alone constitutes a menace. This is indicated by the following figures upon the proportion of births attended by midwives, and the estimated number of women practicing.

In St. Louis midwives report 44 per cent of all births.

New Orleans	"	"	80 per cent	"	"	"
New Mexico	"	"	40 per cent	"	"	"

In Mississippi 4,000 midwives attend 48 per cent of all births.

Alabama	1,500	"	"	60 per cent	"	"	"
Virginia	6,000	"	"	40 per cent	"	"	"
Georgia	5,000	"	"	20 per cent	"	"	"
Kentucky	2,500	"	"	20 per cent	"	"	"
Maryland	2,000	"	"	66 per cent	"	"	"
North Carolina	6,500	"	"	73.5 per cent	of the negro births.		
South Carolina	5,000	"	"	80 per cent	of negro and 20% of white births.		

*Midwife Training.*—So far as one can learn, there is in the entire country but one veritable school for midwife training, connected with a hospital of undoubted standing, in which the pupils are resident, namely, the Bellevue School for Midwives. It was established in 1911 through the combined efforts of the hospital trustees and the New York Committee for Prevention of Blindness. This school is for untrained women, not nurses, and has graduated about 450 midwives. In Philadelphia, the Maternity Hospital and the Preston Retreat will accept applicants for midwife training, but both schools have graduated only about a dozen pupils all told. Some state and local departments of health greatly improve the work of midwives practicing within their bailiwicks by means of supervision, lectures, and demonstrations by doctors and nurses under official auspices; but except for the graduates from Bellevue and two Philadelphia schools, most of the midwives in the United States who approach competency were trained in European schools before coming to America. The excellent work done by many of the trained midwives makes us realize how terribly defrauded are the patients who are attended by unqualified women, particularly in rural communities.

For many years there have been nurses engaged in rural work, (who inevitably perform deliveries among uncared for rural mothers) who have wanted to take midwife training, but there has been no school with a definitely organized course in connection with a maternity hospital, where such nurses could go for this training. As a result of this inconsistent situation, three American nurses have gone to London during the past year and entered schools for midwives.

*Midwife Control.*—So far as official control is concerned, there is no effort in 9 of our 48 states to examine, register or control midwives, much less train them. Any woman who wishes, therefore, may practice unmolested in Maine, Michigan, Nebraska, South Dakota, Texas, Vermont, West Virginia, Wyoming, and Massachusetts. Although the midwife does not legally exist in Massachusetts the registrars of vital statistics are so aware of her presence in the flesh that they pay her twenty-five cents for each birth certificate she files. These officials, in 22 Massachusetts towns and cities give the names of 137 midwives who were paid from state funds for reporting 2,723 births in 1922.

In 17 states there are no state-wide requirements but midwives are supposed to register with a local authority. In 22 states there are irregular requirements for state permission or licensure to practice but in only four of these, New York, New Jersey, Pennsylvania and Connecticut is there anything like satisfactory control of the practice.

The last word in safeguarding mothers and babies will not be said until, in every state, there is adequate provision for training and controlling those who attend these patients, no matter by what name they are called, nor until it is made impossible for untrained people to practice midwifery "habitually and for gain."

#### GENERAL RESULTS AND FURTHER NEEDS

We have considered the details of provisions for excellent care of maternity patients in hospitals; taken a look at the aims and results of prenatal clinic work as well as government provisions for safeguarding the lives of mothers and babies; paid respectful attention to figures telling how many nurses and midwives are doing what in how many states, and mulled over some dry as dust data about what happens to whole and fractional mothers in lots of a thousand.

We perceive that maternity hospital facilities are increasing and the standards of work are improving; doctors and nurses are being trained in increasing numbers; a start is being made to give midwife training to graduate nurses while maternity specialists are becoming available to more and more of the remote and isolated communities. The general public believes more widely in the urgency and feasibility of good maternity care and is seeking such care with growing frequency. Should we stop just there we could all settle back with smiles of satisfaction and complacency.

But the truth is, as you and I well know, that this presentation of facts and figures, from a practical standpoint, is not worth the paper it is written on nor the time it has taken to read it. In years past, many papers—abler than mine, more scientific, possibly longer—have been written, presented and published; and the net result of it all is that there has been no appreciable reduction in our national maternal death rate in twenty-five years.

*What is wrong?*—We know, without help from tables of percentages that the obstetricians in this country can and do give life-saving care to maternity patients, and we also know that year after year an army of women in the prime of life are struck down and killed—or what is often worse are made lifelong invalids because they do not receive this care.

*What is wrong?*—The answer is so apparent it seems scarcely worth while to voice it.

Complete and skilful maternity care is not widely enough available in this country and the lay public is not as yet widely enough convinced of its urgency. We still have too few good doctors and too many poor ones practicing obstetrics. Too few well trained maternity nurses and midwives. Too few hospitals and other agencies provide complete maternity care to patients, and facilities for training to doctors, nurses and midwives.

The remedy is education. The attitude back of this education, in my judgment, is the heart of the whole situation.

Every detail of maternity work that is done, east, west, north and south must originate in and be guided by the medical profession. From managing the ponderous machinery of government organization down to bathing the eyes of a baby in a remote mountain cabin, the entire scheme is the application of medical teaching—application to the individual mothers and babies of the practices that the medical profession has demonstrated, will safeguard the lives and health of these patients.

What we need is not that the high peaks of obstetric work in this country shall be higher, making it possible to save a few mothers from rare complications, but that the average of the care given to all patients shall be raised. That every expectant mother shall be taken seriously. That every detail of the care and supervision of even normal cases shall be regarded as of such importance that it will be performed earnestly and conscientiously. That those in high places give high value to obstetric practice is not enough. The whole question needs to be exalted in the minds of the many to the plane it now occupies in the minds of comparatively few. By precept and example, every student and every nurse should to be so impressed by the dignity and enormous importance of all obstetric work that their attitude will be communicated to others, patients included.

Wherever really good work has been done, in the cities or country, we find that those who are doing it have not only knowledge and skill but a spark of something else—call it devotion, reverence, what you will—but something that characterizes the work with dignity and respect. When one considers the scope of obstetric practice—how necessary are skill, resourcefulness, insight, and sympathy—it may well challenge the most and the best that one has to give.

Education then. Education that fires and drives and inspires, from the medical profession down through its various assistants and the laity.

Education that will so impress every human being with the urgency and feasibility of good maternity care, that will be demanded and given in every case. Education in its broadest, completest sense will inevitably go far toward reducing our utterly wicked, needless loss of mothers and babies.

Publications from the following sources of information have been consulted: the Federal Children's Bureau, United States Public Health Service, United States Census Bureau, American Public Health Association, American Child Health Association, National Organization for Public Health Nursing, Statistical Department, Metropolitan Life Insurance Company, Pennsylvania Bureau of Medical Education and Licensure, Henry Street Nurses' Settlement.

149 EAST FORTIETH STREET.

(For discussion, see p. 723.)

# WHAT NEW YORK STATE IS DOING TO REDUCE MATERNAL MORTALITY\*

BY FLORENCE MCKAY, M.D., ALBANY, N. Y.

(Chief of the Division of Maternal Welfare, State Department of Health.)

THE maternal death rate in New York State outside of New York City, like that of other states in the Union, is high. For the five year period, 1916 to 1920, the up-state rate from all puerperal causes was 66 for 10,000 births including stillbirths; 69 for cities and for rural areas 58. For New York City it was 46. At that time the distribution of rates throughout the state was computed for as by the Division of Vital Statistics. This was published in a bulletin,—*The Geographical Distribution of Maternal Mortality and Stillbirths in New York State*. The rates for single years since 1920 indicate that there is some decrease throughout the state. The 1923 rate was 60 and the provisional 1924 rate was 54. What the relation of the work of the State Department of Health bears to the reduction of mortality rates is a question which cannot be definitely answered. Other organized and individual efforts in many instances deserve due credit.

In analyzing the causes of puerperal deaths in the state, we find that puerperal septicemia alone causes more than 30 per cent of the deaths; puerperal albuminuria and convulsions cause 26 to 27 per cent and the remaining percentage includes all other causes. Whether the other causes are subject to reduction is not a question for discussion at this time but certainly we are all agreed that puerperal septicemia and eclampsia are capable of reduction.

In the endeavors of the Division of Maternity, Infancy and Child Hygiene toward the reduction of these rates in New York State it is our purpose to stimulate local responsibility and to assist local effort in improving maternity care during pregnancy, confinement and the puerperium. We try to furnish public health education in maternity care to mothers, midwives and nurses and to increase the interest of physicians in the public health aspects of maternity care. We also make such surveys, studies and demonstrations as may broaden our present field of knowledge and tend to increased effort and improved methods. Some of the methods which we are using in striving toward these goals are hereinafter briefly described.

## MOTHERS' HEALTH CLUBS

In order to teach mothers how to take care of themselves and how to prepare for confinement and to care for their babies, we foster the organization of women in groups termed "Mothers' Health Clubs." These are taught by public health nurses, the basis of instruction in maternity care being that outlined in the *Routines of the Maternity Center Association*. During the past year, thirty-five groups of women have been formed for instruction in maternity care. Some have been taught by both local nurses and others by nurses from the State Department of Health. For instance, during January and February of this year nurses from our own division are teaching from one to two groups in seven counties in the state giving one lesson each week to each 45 groups. By this means we

\*Read at a meeting of the Section of Obstetrics and Gynecology, New York Academy of Medicine, January 27, 1925.

hope not only to teach the mother the care of herself, but to bring about a quicker contact between the mother and her physician in order that she may have continuous medical supervision throughout pregnancy. We welcome to the groups not prospective mothers alone but any women who may be interested in this subject, knowing well that any mother may need this information at any time; that each member of the group is a source of dissemination of a certain amount of information among the uninformed in her neighborhood and even that it is a good thing to have grandmothers well informed on this subject.

#### COUNTY FAIRS

Rural mothers are particularly difficult to reach, but most of them attend the county fair. In addition to the rural Mothers' Health Clubs, many of which are organized among the agricultural groups, we have for the past two years conducted a maternity and infancy exhibit at most of the county fairs in the state, in charge of a maternity and infancy nurse. Every opportunity is given for individual conferences of mothers with the nurse and in this way we have reached more than 13,000 mothers, giving 3841 mothers individual instruction, with a total of 15,144 people reached in groups. These county fair exhibits have been the starting point of a number of Mothers' Health Clubs and of local interest by physicians and nurses in maternity problems.

#### MATERNITY HYGIENE CLASSES

In order to have standardized teaching of Mothers' Health Clubs it was found necessary to give additional instruction to many of the public health nurses who had had no experience in teaching maternity hygiene. We have, therefore, conducted maternity hygiene classes for nurses in 37 communities in New York State reaching 713 nurses, 275 of whom have completed the course and matriculated and are now able to teach Mothers' Health Clubs in their own localities.

#### PRENATAL CONSULTATIONS

In communities outside of New York City prenatal consultations are a new development even in connection with hospitals. Those conducted in child hygiene stations are even more of a novelty. Previous to the organization of our prenatal consultation unit there were practically none of the latter in New York State outside of New York City. It was with some trepidation that we introduced this phase of our work but it is proving to be one of the most successful of our activities. Our prenatal consultation unit comprises a full-time experienced obstetrician and two full-time public health nurses who travel from place to place throughout the state conducting prenatal consultations once a month. This is done in response to request from the local health officer and the work is conducted only in communities where public health nursing is already established as it is necessary to depend upon the local public health nurse for intermediate follow up of the cases. One nurse does the advance work for the first consultation, at the same time demonstrating methods to the local nurses. The other nurse travels with the obstetrician assisting in the conduct of the consultations. Two hundred seventy-two consultations have been held in 30 communities with a total attendance of 1482. So great has been the demand for this type of work that on December 1, it was necessary for us to add an additional obstetrician to our staff. The patients reached in the prenatal consultations are primarily those of midwives or those who have made no provision for maternity care. We are willing, however, to take patients of physicians if they request in writing that they desire this service and there is a slow but steady increase of such requests



from physicians. Our prenatal consultations are conducted only until the locality is ready and willing to take over the work for itself. Our unit then withdraws and the work is then conducted by local physicians and nurses.

#### FINANCIAL AID

Through the Federal funds made available by the Sheppard-Towner Maternity and Infancy Act we are able to assist financially in the employment of local physicians and nurses conducting maternity and infancy work. We have offered to pay into the local public treasury about half the salary of a local nurse in certain communities providing the community contributes at least an equal amount from public funds and there are now twenty-five nurses operating on this plan. We require that the nurse spend at least one-half of her time or its equivalent on maternity and infancy activities which are supervised by the Division. This type of nursing aid has been given chiefly in cities. In order to extend a nursing service to rural communities where it is especially needed and where it is more difficult to raise local funds we are now about to undertake the placing of a nurse in a rural community for at least one year and allowing the local community to gradually year by year assume as much financial responsibility as they may be able to carry.

We are also able to offer to local physicians who take over prenatal consultations or do other types of maternity and infancy work an honorarium of from one hundred to two hundred dollars a year depending upon the amount of service rendered.

#### CONSULTANT NURSES

We have in the state four maternity and infancy nursing districts, each one in the charge of a consultant nurse who has had special training and experience in maternity and infancy work. These nurses and their assistants give help in the establishment of new maternity and infancy activities or the extension of this line of work in local communities, by going into the communities, working with the local nurse, teaching her methods where needed and helping her until her work is firmly established.

The methods of maternity work in rural communities have as yet not been standardized. To the Maternity Center Association of New York we are indebted for careful standardized urban methods, many of which are applicable to rural communities. In some phases of the work, however, the methods must of necessity vary in a rural community. We are now about to undertake a study of such methods and possible standardization of rural maternity methods by working out in one of the smaller rural counties of the state a practical rural maternity program. We have taken on our staff nurses trained at the Maternity Center Association and are fortunate in having the assistance of the Directors of that association in working out the details of this rural program. We hope that the work done here may be of assistance to all rural work in New York State and possibly to other states as well.

#### REGIONAL CONSULTANTS

Our work in interesting physicians is done largely through our Board of Regional Consultants in Obstetrics who in addition to this activity act as an advisory committee to our division in all phases of our work. They are available for meeting medical societies in any part of the state. At first their talks to medical societies comprised largely the explaining of the work and purposes of our division. Now they are branching out more in the line of lectures and clinics and plans are at present under way for an increase in this type of service. One

of their early activities was the formulation of a little leaflet entitled "Standards of Maternity Care" designed for the use of physicians. This has been sent to all physicians in the state. Recently standards for the work of local physicians in prenatal consultations have been devised and are about to be used, particularly in the communities to which we are giving financial aid. The assistance given by this board of consultants who serve without salary is of an inestimable value to the work of our division.

#### SURVEYS

In some communities where maternal and infant mortality rates have for some time been persistently high, we have been requested by the Medical Society or the local Health Officer to make a survey of the community with recommendations for the reduction of rates. This has been done in Ogdensburg, Plattsburgh, Rensselaer County and Troy, Cohoes and Amsterdam. In three of these communities there has resulted the establishment of new maternity and infancy activities; in the other two, preparations for the establishment of such work are under way.

#### PUERPERAL DEATH QUESTIONNAIRE

In order to obtain more information concerning the causes of puerperal deaths a questionnaire has been sent to all physicians who signed certificates of death from puerperal causes. We have had excellent cooperation from these physicians who have given of their time freely in the answering of these questionnaires. A separate special study has been made of these results.

#### PUERPERAL SEPSIS REPORTING

With the high puerperal septicemia death rate in mind, we have been making a special campaign during the past year for better reporting of puerperal sepsis both as to cases and deaths. Many more deaths than cases are reported. Letters have been sent to physicians all over the state and reports received carefully checked and followed up.

#### OBSTETRIC PACKAGE

Another effort toward the reduction of puerperal sepsis has been to promote the making and distribution of a sterile obstetric package. This package contains the towels, bed pads, leggings, gauze pads, etc., needed for home delivery. The packages are made by local women's clubs, sterilized at local hospitals and made available to local physicians and midwives, either free or at cost. The directions for the making and demonstration of methods are provided from our Division. Last spring three nurses demonstrated these packages to nearly all public health nurses, all the midwives in the state, to many women's organizations, to several physicians, and to two county medical societies. A letter has been sent to all physicians in the state explaining that they can have this service in their own community by interesting some local women's organization or the public health nurse. We have no means of knowing how general has been the use of these packages except through letters of appreciation which come to the division. We have on record 58 communities where packages have been made or are in the process of making, but we have sent out about 250 sample packages for demonstration.

#### MIDWIVES

The licensing and supervision of 430 midwives has for many years been a function of this division. Recently we have been endeavoring to add some instruction and to arouse in the midwives a greater feeling of responsibility for their

patients. In a few communities we have been instrumental in forming midwives' clubs which are a semi-social organization addressed at regular intervals by physicians or nurses on some phase of midwifery work. Where such clubs have not been formed, we have been able to get the midwives together in groups for such instruction. Lectures on nutrition of the expectant mother have been included in these groups and all have been well received by the midwives.

#### FURNISHING SUPPLIES

For nurses and physicians who are conducting prenatal work throughout the state we furnish record forms, exhibit materials, literature, prenatal bags and some other supplies as necessary. We also furnish films, slides, lecturers and literature to all types of organizations requesting them.

This report is submitted as presenting by no means a complete or perfect maternity program for New York or any other state. It merely outlines the result of what we have been able to accomplish in the organization of entirely new work over a two year period. We are earnestly hoping to produce a more complete and more perfectly organized piece of work within the next few years.

*(For discussion, see p. 723.)*

# Society Transactions

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## AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SEVENTH ANNUAL MEETING  
CLEVELAND, OHIO, SEPTEMBER 18-20, 1924.

*(Continued from April)*

DR. JAMES K. QUIGLEY, Rochester, N. Y., read a paper entitled **Rupture of the Uterus, Including a Report of Two Cases with Recovery Following Hysterectomy.** (For original article, see page 685.)

### DISCUSSION

DR. LOUIS E. PILANEUF, BOSTON, MASS.—I want to briefly report a case of ruptured uterus I operated on six months ago, in order to bring out one point which has not been mentioned.

This woman was seen in consultation in her fifth month of pregnancy. She had been bleeding ten days and placenta previa diagnosed. The bleeding had brought on a severe anemia. I saw her at about five in the afternoon. Shortly after her admission to the hospital, the bleeding gradually ceased. The next morning the bleeding started again; she was given light ether anesthesia, and her uterus and vagina were packed. It was noticed at the time that her cervix was filled with scar tissue and dilated to admit a finger. Contractions started in the afternoon of the same day, and at seven o'clock the next morning she had very severe pains. When I saw her the pains had stopped. She was taken to the operating room and given light ether anesthesia and the pack was removed. The cervix was rigid and still admitted one finger. Upon removing the pack the anterior vaginal wall was seen to bulge. A short incision was made in the vaginal wall transversely and I found that the uterus was ruptured. The patient was given 600 c.c. of citrated blood intravenously. She rallied after that, and with small doses of morphia was kept comfortable. At five in the afternoon her pulse was 120.

She was now prepared for a hysterectomy. Upon opening the abdomen the fetus and placenta were found extruded under the bladder, and that the fundus was firmly contracted behind the mass. The bladder peritoneum was incised; the products of conception, together with a large quantity of blood clot were removed, and a supravaginal hysterectomy with double salpingoophorectomy were performed, using clamps.

This patient had marked distention of the colon and ileum, not infrequently found in this type of case. A patient may stand a hysterectomy for ruptured uterus, but she is not always able to stand the added shock of active treatment for distention. To avoid this, I did a cecostomy, introducing a No. 28 French catheter in the cecum, and drained abdominally and vaginally. The result of the

enterostomy was that this patient did not have to be treated for distention and thereby kept her strength. She was given her first enema on the third day; the fecal fistula was closed on the twelfth day, and she was discharged well at the end of three weeks.

DR. H. W. HEWITT, DETROIT, MICH.—I would like to discuss this paper from the standpoint of an abdominal surgeon. It seems to me that rupture of the uterus is an abdominal emergency and should be so treated.

The question comes up as to the best manner of stopping the bleeding. There are two ways of doing that. Babcock would tell us to go in through the vagina and put clamps on the broad ligament, do nothing else, and transfuse the patient. Of course, in extreme conditions that would be satisfactory, but a quick laparotomy, tying them off, and putting in a Crile pack, quickly closing the wound as a primary operation, next transfusing the patient, and then going back later and taking out the uterus, seems to me a good procedure.

Of course, in cases that are not badly shocked it seems to me the best procedure would be to repair the uterus and transfuse the patient with blood if necessary.

If the patient does not need blood transfusion but is in poor physical condition, large quantities of fluid given by hypodermoclysis under each breast is a very satisfactory procedure, and the way in which we do it is to put a needle under each breast and leave them in, and the interne later gives a 5 per cent glucose solution. He can fill the reservoir with glucose solution and keep it warm and give an amount of glucose solution every two hours. A large amount of fluid will help, but I think the blood transfusion done once or twice or three times, or as many times as necessary, will save the patient.

DR. WILLIAM E. DARNALL, Atlantic City, N. J., presented a paper entitled **Pseudocartilaginous Cyst of the Ovary**. (For original article, see page 683.)

#### DISCUSSION

JAMES E. DAVIS, Detroit, Michigan.—There is just one point that is of very practical importance in this type of growth. If it is confined entirely within a cyst wall and is nonadherent to the peritoneum, it does not matter what the histologic characteristics are within the wall, but just as soon as the proliferation is such as to penetrate the wall and adhere to the peritoneum, it should be designated definitely as malignant.

DR. WALTER T. DANNREUTHIER presented a paper entitled **Combined Radium Therapy and Operation in the Treatment of Cancer of the Uterus**. (For original article, see page 608.)

DR. PAUL KLEMPERER, New York, read a paper (by invitation) entitled **Histopathologic Changes in Uterine Carcinoma Treated with Radium**. (For original article, see page 619.)

DR. HENRY SCHMITZ, Chicago, Ill., presented a paper entitled **The Treatment of Inoperable Cervical Carcinomata with Measured Doses of X-rays and Radium Based on Microscopic Examinations.** (For original article, see page 644.)

DR. U. V. PORTMANN, Cleveland, Ohio, presented a paper entitled **Radiation Therapy of Carcinoma of the Uterus.** (For original article, see page 658.)

DR. THOMAS E. JONES, Cleveland, Ohio, presented a paper entitled **The Rôle of Radium in the Treatment of Cancer of the Cervix.** (For original article, see page 662.)

DR. GEO. W. CRILE, Cleveland, Ohio, read a paper entitled **Suggested Biophysical Interpretation of Cancer.** (For original article, see page 642.)

#### DISCUSSION ON THE PAPERS OF DRS. DANNREUTHER, KLEMPERER, SCHMITZ, PORTMANN, JONES AND CRILE

DR. E. A. WEISS, Pittsburgh, Pa.—Some of the statistics quoted this morning show clearly that the operative results for cancer of the cervix are far from satisfactory and often disappointing. I was formerly very enthusiastic about the radical operation. In recent years we have adopted the combined treatment and our results were far better than with the radical operation. But even with this method the end-results, that is the five year and the eight year results, were not satisfactory; even though the immediate mortality was not high and the morbidity was not great.

When we compare such results with those obtained with x-ray and radium, we must admit that in spite of our enthusiasm for operation, we are justified in giving up the more radical procedures for these more conservative measures. During the past year, only three times did we attempt the so-called radical operation, and I believe I am safe in saying that in the coming year there will be no radical operations and all cases of cancer will be treated by radiation according to the methods outlined.

DR. T. E. JONES.—With regard to the intoxication that goes on after radiation, I would like to quote, for instance, cases of splenomyelogenous leucemia which must be looked upon as a malignant disease. Patients come in with the abdomen practically filled with spleen, and I have given them as high as 15,000 hours radium in periods of thirty-six hours without observing the slightest bad effect, no nausea, and no vomiting. If cellular destruction accounts for toxic symptoms, it appears to me that these patients should be very ill.

DR. W. S. BAINBRIDGE, New York City.—I wish to emphasize the necessity for the recognition by the surgeon, not only of the existence of cancer in the patient, but also the necessity of being able to estimate the *degree* of the malig-

nancy present. Our records show many cases sent to us as irremovable and inoperable cancer which have proved to be neither inoperable nor irremovable. Dr. Crile's recent effort to develop new methods of diagnoses may prove a real boon in the cancer field, particularly in these clinically doubtful cases.

Operability and inoperability are terms frequently misconstrued. I attempt to classify my cases as those which are *directly operable* and *indirectly operable*, and those which are *inoperable*, *directly* and *indirectly*. Many cases are termed "inoperable" simply because of faulty diagnoses. Not that the cases so diagnosed are free from cancer, but because there are present other pathologic conditions which mask the true limits of the malignant disease. In many cases the patient is dying, not so much from the cancer, as from absorption of toxic products. While it may be true that some of these toxins emanate from the neoplasm, it is equally true that more often the patient's apparently hopeless condition is due to faulty elimination, pus, etc., and that with the correction of these, the patient's physical status may be improved to an unbelievable degree.

The cases which are directly inoperable, but indirectly operable, are the ones which I wish to emphasize here. For twenty years, or more, we have been experimenting with one agent after another in the treatment of these cases. First, we tried heat; then chemical applications; next, radium or x-ray, or radium and x-ray combined, and, finally, the pendulum has swung back again to surgery, either alone or combined with one of these other agents.

For the last fifteen years, it has been my plan, in frankly irremovable cases, irremovable from the standpoint of any hope of cure, to treat the patient very much as we treat a fire aboard a ship at sea. We know the fire cannot be put out, but we realize that it can be kept from spreading from one compartment to another by closing the hatches and preventing any oxygen from reaching the blaze. The situation is primarily the same in irremovable cancer, in many cases.

In irremovable pelvic cancer, if there are no contraindications, I perform a laparotomy, then ligate the ovarian arteries; perform double oophorectomy; ligate the internal iliacs and, when large, the sacra media. After this ligation, the glands along the iliacs are removed en masse, from the receptaculum chyli to the obturator foramen. The glands situated within and around the obturator foramen are removed and all pathologic conditions corrected as far as possible. In accordance with the Beatson theory of the presumptive influence of the ovarian irritation upon the cancer process, removal of the ovaries and parovarian tissue is indicated. After completing the above operative procedure, all has been done for the patient with uterine carcinoma, which in the present state of knowledge of cancer therapy, is possible. By arterial ligation and lymphatic block, in many cases of pelvic cancer, the growth has been checked for a considerable period of time, the patient has been made infinitely more comfortable and in the end has died from causes not directly associated with the cancer.

DR. GEO. VAN AMBER BROWN, Detroit, Michigan.—We are all pretty well agreed that x-ray and radium, or heat will destroy the cancer cell. The great trouble is to get at the cancer cell in remote areas, and on account of the very discouraging results from x-ray and radium, or a combination of the two, five years ago I began the use of the starvation ligature as has just been described by Dr. Bainbridge, adding to the starvation treatment the use of heat, and I want briefly now to tell you the results of my experience.

From twenty consecutive cases operated on in this way, there was no immediate mortality. Since operation, one of those patients has been lost track of; five have died, and there are fourteen living. Out of fourteen that are living, eight are subjectively and objectively well, which means that up to the present

we have an apparent cure of 40 per cent. The time average for those eight now is about two years and nine months. The longest time that has elapsed in any of these cases is four years and one month, and that in a case I have cited previously of a young woman twenty-seven years of age with so-called incurable inoperable cancer, which could only be dealt with by indirect approach. The woman refused to have her ovaries removed. I held a consultation and was advised not to operate on the woman, as the case was hopeless. A specimen was taken for microscopic study, sections were made and reported carcinoma. That young woman is today perfectly well. She has gained 30 pounds in weight, menstruates three days out of each month just as she did in her earlier days before carcinoma started. I think this is a result you never could hope to obtain by either x-ray or radium, because with the use of either we certainly would have sterilized the patient, producing amenorrhea, while following the heat and starvation ligature treatment this woman is not sterile.

DR. ARTHUR STEIN, New York, N. Y., presented a paper entitled **Gangrene of the Extremities Following Gynecologic Operations and the Puerperium**. (For original article, see page 595.)

#### DISCUSSION

DR. W. W. BABCOCK, Philadelphia, Pa.—I remember a case which was very much like the one Dr. Stein has described; the clot recurred as Dr. Stewart sutured the artery; he reopened and removed the clot and again it recurred. Finally, he gave it up in despair. The endothelial lining of the artery where a thrombus forms is so changed that when the blood touches the spot it at once begins to clot. With this endothelial change present, the condition seems rather hopeless.

If you operate on arteries, I can commend as a simple clamp, a bit of soft tape, preferably of silk, held snugly about the vessel by a suitable hemostat. The tape will occlude a large artery with but little pressure and little traumatism.

A word about thrombosis in veins. If these are septic, or even if they are not septic, be very careful and do not displace or remove them. In the very few instances in which I have seen septic thrombi of varicose veins of the leg treated by ligation or phlebectomy fatal dissemination of clot or bacteria has occurred. Gently incise and drain a suppurating vein, but do not ligate, curette, irrigate or excise it.

The death of a medical friend of mine brings up the warning also to avoid massage near a thrombus. An operation had been done for cancer of the sigmoid and following this an acute thrombosis in the veins of the leg occurred. For the violent pain that came with the thrombosis, the leg was gently massaged. Within about fifteen minutes the doctor was dead from pulmonary embolism. You rarely see this catastrophe if you protect the so-called "milk legs" that occur after pregnancy or other cause. Wrap them up and keep hands off and elevate them, and treat them in a careful, conservative way.

DR. HENRY SCHMITZ, Chicago, Ill.—In regard to thrombosis, the question arises whether we can do anything to prevent it. Usually we will find in these large abdominal tumors, and sometimes even in the small ones, an enormous dilation of the pelvic blood vessels. It has been our practice in our clinic to gently compress the blood out of the blood vessels towards the uterus and then clamp the vessels. It is surprising to see the rapid contraction of the blood vessels.



The second question is whether it is always indicated, or whether it is good surgery to remove the normal appendix when operating on such severe pelvic pathology. We are coming more and more to the conviction that in operations for these large tumors, or other severe pathology, it is good surgery to leave the normal appendix.

Finally, a little point in technic might be mentioned which is very important and might improve results in treatment. Make an incision over the involved artery low down in the leg and then irrigate the entire length of the blood vessel from below upward. In this way we are able to remove almost all embolic material. Of course, if the embolus is situated high up in the pelvis or beyond the inguinal ligament, we cannot remove the obstruction in this manner.

DR. W. S. BAINBRIDGE, New York.—Perhaps two added cases might prove of interest in connection with this important paper. One occurred at the Presbyterian Hospital, New York City. It was cancer of the right groin, which proved to be irremovable, and involved both the femoral artery and vein. The hemorrhage could not be controlled until the external iliac vein and artery had been ligated just above Poupart's ligament. Gangrene of the leg developed very promptly and amputation was necessary. The patient lived for some weeks and later died of pneumonia.

The second case was one in which we attempted to do the starvation ligature operation in a uterine cancer. We tried to tie off the internal iliac on the right side but the artery was so badly diseased, not from the cancer, but from arteritis, that it gave way and I was compelled to tie the common iliac just above its bifurcation, in two places, a half-inch apart. Ligation of the left iliac was done, and the patient lived nearly a year and was able to get about and enjoy life. There was no marked circulatory disturbance. There was a slight numbness of the limbs for a time, but compensatory circulation took place. Later, the patient died of the irremovable uterine cancer.

I may say in passing, that in over 200 cases in which I have ligated both internal iliacs, both ovarian arteries and, in some cases, the sacra media, as well, I have seen no cases of gangrene nor have I seen sloughing of the bladder wall or contiguous structures. Occasionally, I have seen a marked shrinking and distinct pallor of the cancer mass, following the arterial ligation.

DR. STEIN (closing).—I fully agree with Dr. Babcock that cases of thrombosis of the veins should be left alone. I only wanted to bring out the importance of an early diagnosis of the occurrence of an embolism in the large arteries, and the performance of an early arteriotomy.

I fully agree with Dr. Schmitz, that in some cases it might be necessary to make not only one incision into the artery, but two, so that one might be able to thoroughly wash out the artery with a catheter.

There is another point in the technic, namely; as we all know through Lewisohn's excellent investigation in his blood transfusion, that sodium citrate prohibits the coagulation of blood, I would suggest that anybody who attempts an embolectomy use a sodium citrate solution, instead of ligatures soaked in oil.

DR. A. H. BILL, Cleveland, Ohio, read a paper entitled **A New Axis Traction Handle for Solid Blade Forceps**. (For original article, see page 606.)

## NEW YORK OBSTETRICAL SOCIETY

MEETING OF JANUARY 13, 1925

THE PRESIDENT, DR. REGINALD M. RAWLS, IN THE CHAIR

DR. ISIDOR KROSS presented a paper entitled **Ovarian Transplantation**.  
(For original article, see page 628.)

### DISCUSSION

DR. FREDERIC C. HOLDEN.—I would like to ask where one may procure healthy immature ovaries.

DR. KROSS.—In any maternity hospital there are always a number of stillbirths that occur in patients who have no positive Wassermann reaction. Carrel has shown that you can take a young ovary, or any tissue, and keep it in a refrigerator, unchanged quite a while. So given the patient, you can get the material very readily.

DR. FREDERIC C. HOLDEN.—Has that been done?

DR. KROSS.—No, it has not been done to my knowledge. The only thing is this: there has recently been published a German work in the *Zentralblatt für Gynäkologie* (Zondek and Wolff, 1924, No. 48, p. 2195), where ovaries were used that were kept in a refrigerator. Zondek and Wolff did not use immature ovaries, but apparently got fairly good results. They have not kept their cases on record for a long time because the work has just been recently done.

DR. ROBERT L. DICKINSON presented a paper entitled **Animal Studies of Fertility and Sterility Bearing on Human Problems**. (This article with its discussion will appear in a subsequent issue.)

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## NEW YORK OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 10, 1925

THE PRESIDENT, DR. R. M. RAWLS, IN THE CHAIR

DR. HERBERT THOMS presented a report on **X-Ray Pelvimetry**. (For original article, see page 667.)

### DISCUSSION

DR. THOMS.—In reply to Dr. Mabbott's question, I would say that the centimeter-square-grid is made for each patient. I expect later however, to make a rule or gauge which will probably obviate this extra exposure.

I do not see why the cost should be in any way prohibitive. The whole procedure only takes about ten minutes. Of course the obstetrician should work

with the roentgenologist. The obstetrician can more accurately palpate the fetal head and determine the plane of the biparietal diameter.

Such a method is not intended to be a routine procedure. However, in certain cases it becomes a great comfort and satisfaction. In cases of slight or moderate disproportion at term and in cases which present themselves early in pregnancy where all the external measurements are below normal, to be able to determine the diameters of the inlet with an exactness of one or two millimeters in such instances is of utmost value.

DR. WILLIAM THALHIMER, of Milwaukee, Wis., presented (by invitation) a paper entitled **Treatment of Excessive Vomiting of Pregnancy with Insulin and Glucose**. (For original article see page 673.)

#### DISCUSSION

DR. W. M. FORD.—May I ask the doctor if he attributes the vomiting to an increase of the ketogenic bodies in the blood? If so, why does he concentrate his treatment on increasing the carbohydrate intake and the carbohydrate metabolism? Is it because he feels that the increased carbohydrate metabolism, the so-called "fire of the carbohydrates" is what burns up the ketogenic bodies, or rather prevents their formation by oxidizing the fats in the flame of the carbohydrates? If this is his theory why is nothing said about the examination of the blood sugar throughout the entire course of the treatment of these cases? If there is a deficiency in blood sugar it would be perfectly logical to put a large amount of glucose into the blood stream and to administer the insulin in order to increase the metabolism of the carbohydrates, thereby increasing the carbohydrate fire which would burn up the fat which is the only source of the ketogenic bodies. However a deficiency of blood sugar has not been demonstrated by a single report of a blood sugar examination. A urinary sugar reaction in the pregnant woman is very often misinterpreted. Two or three such cases have been called to my attention, and on careful examination it was discovered that the condition was not a glycosuria but a lactosuria which gave the sugar reaction. May I ask Dr. Thalhimer whether in his cases steps have been taken to determine if the sugar reaction was a true glycosuria? I would like also to know how he accounts for a rapid disappearance of the acetone and the ketogenic bodies from the blood when he has administered glucose and insulin, because as I understand the situation, the insulin and the glucose increase the metabolism and prevent the formation of additional acetone bodies by completely oxidizing or burning the fats; the fats being the sole source of origin of the ketogenic bodies. These acetone bodies already formed must be in stable combination and must be eliminated through the kidneys and lungs. Has anything been done to obtain evidence of increased basal metabolism as the result of the administration of insulin and glucose? How do you account for the increase of the alkaline reserve without the administration of alkali to neutralize the acetone bodies in the blood, except by the elimination of the excess of acetone bodies through the kidneys, a process stimulated by the administration of large quantities of water, but slow at best?

DR. A. B. DAVIS.—These cases of so-called pernicious vomiting sometimes present the most distressing complications and sometimes are apparently the most hopeless cases that we have to deal with. Within a year I have had two cases of excessive vomiting, one of them in the early months of pregnancy, which turned out to be a hydatid cyst without any bleeding. In another case, vomiting continued in spite of glucose, not given intravenously it is true, but still well

given. The condition became dangerous and we found a small dead fetus with cysts about one-quarter the size of rice seed all through the little premature placenta.

It seems to me that we have to keep those cases in mind, and I doubt very much if this treatment would be efficacious in such instances.

DR. HAROLD BAILEY.—I have been very much interested in the administration of sugar by vein ever since Dr. Titus visited us here some years ago. He was kind enough to send on slides of the livers of five cases that had died after the administration of sugar. One was a case of acute yellow atrophy, one was a case of early vomiting, and the others were cases of eclampsia. The pathologic picture as regards the liver was not present in these slides. It is true they all showed some colloid or other degeneration, but in the eclamptic cases hemorrhages were entirely absent and also embolism of the vessels around the bile ducts.

Before insulin came out, I used the sugar in a number of cases of pernicious vomiting and I must say that it produced a most striking effect. In the administration of sugar I gave only 25 grams in twenty-four hours and repeated it, using a 10 per cent solution. However, I was brought to a standstill after I administered 25 grams of sugar, without insulin, in a case of acute yellow atrophy at the seventh month. The patient had a hyperglycemia, with a temperature rising to 108°, and died very promptly. Shortly after, within the last six months, one of my colleagues on the service had a case of vomiting in the early months in which sugar with insulin was given and death followed in a few hours. It seems to me that there is some danger attached to the injection of sugar into the vein, with or without insulin.

Some of the sugar preparations were not perfectly clear and the doctor has suggested to me that possibly there was some other drug in the solution; as to this I can only state that it came out of the operating room in the regular course.

There are two points that have impressed me in the discussion of this subject. In the first place, if the sugar is given for acidosis then why not give it in cases of eclampsia that have a marked acidosis, some of them as low as 16 or even 12. Most of the vomiting cases are around 40 or 38, so it would seem logical, if it is the acidosis that is being treated, that these eclampsias receive the sugar. It appears obvious, to me, that the cure of the vomiting cases by the administration of sugar is not effected by the clearing up of the acidosis, which is mild, but in some other way. It may be that the presence of glycogen in the liver enables the patient to withstand whatever toxin is besetting her and we have experimental evidence that sugar acts in this manner.

DR. GEORGE G. WARD, JR.—I would like to know what method the doctor uses with his apparatus for determining the temperature of the solution. I am interested in that because we use glucose and gum at the Woman's Hospital, as a preventive of acidosis, not in pregnancy, but in cases of postoperative shock. We have a Bovée thermometer which is inserted along the course of the rubber tube and is most convenient for determining the temperature at the time the solution is given. One of my associates, Dr. Farrar, has made a great many observations on the CO<sub>2</sub> combining power and has determined in normal women that the average rate is 55 per cent.

DR. G. H. RYDER.—I want to endorse what Dr. Thalhimer has said by reporting one case of excessive vomiting of pregnancy, treated after the methods outlined by him. The patient was a young woman in her second pregnancy. She is reported to have had excessive vomiting early in her first pregnancy, but was not under my observation until this was over. During the first five months of her

first pregnancy when she was under my care she had occasional periods of vomiting only, but was in good condition and had a normal confinement and puerperium, with a healthy baby.

In the second pregnancy, she came to me at the end of the second month, with moderate vomiting, which rapidly became alarming. She was sent to the hospital and after treatment by diet and colon irrigations, in a week seemed well again; the vomiting has ceased and she regained her appetite. Her  $\text{CO}_2$  absorption test showed 56 per cent. After being at home a short time, however, the vomiting returned gradually, and in spite of treatment grew worse. She was readmitted four weeks later in an alarming condition.

On admittance her  $\text{CO}_2$  absorption test or alkali reserve was only 29 per cent, with urine full of diacetic acid and acetone, with a small amount of bile. Her tongue was dry and her pulse was rapid and she looked very sick. It seemed as though she must be curetted at once to save her life. Before doing this, however, it was decided to try the method of intravenous glucose infusion with insulin as outlined by Dr. Thalhimer.

The day after admission, the patient was given by vein 850 c.c. of a 10 per cent solution of glucose with 18 units of insulin. She took it well and was decidedly better the next day, though still vomiting. Her alkali reserve had risen to 38.2 per cent, however, though the urine was little changed. A second treatment similar to the first was given. This was followed by marked improvement in every way, though there was still a little vomiting. The alkali reserve rose to 53 per cent. The next day with no intravenous treatment it rose to 57.6 per cent, but dropped the following day to 46.2 per cent. A third intravenous treatment was given at once and the next day the alkali reserve was 58.6 per cent. The fourth and last intravenous treatment of the same amounts was given and two days later the alkali reserve was 57.6 per cent. The patient was now out of danger, looking and feeling well, vomiting occasionally only. The diacetic acid, acetone and bile decreased slowly but surely, and ten days after the last treatment the urine was entirely normal. The patient left the hospital shortly after, and through the rest of her pregnancy was very well with no vomiting. She was confined at term, giving birth to a normal child, and having a normal puerperium. Her placenta on careful microscopic examination was found normal.

DR. THALHIMER (closing).—Dr. Ford has asked a number of extremely important questions. Unfortunately because of my present knowledge, I would say it would take about two years of intensive work to answer some of them.

As far as the blood sugar is concerned in relation to disturbed carbohydrate metabolism, the blood sugar is not excessive in these cases, and if there is a perverted carbohydrate metabolism it must be of a different kind than in diabetes. As far as the relation of fats, ketogenic bodies and antiketogenic bodies to the action of insulin is concerned, I think we have some data, more theories and very little knowledge. The Schaeffer ketogenic-antiketogenic theory has recently met with some experimental data which seem to show contradictory evidence. There is some evidence to indicate that insulin may have an important direct effect on the metabolism of fats and directly cause the disappearance of ketone bodies instead of causing this only through its action on carbohydrate metabolism.

As far as the glycosuria in some of these cases of pregnancy is concerned, a great many patients have been condemned as diabetics because of having a supposed glycosuria when it has been a lactosuria. Nevertheless, there are quite a number of well authenticated cases on record where a temporary glycosuria has been demonstrated (not by the yeast test, but by other tests, as yeast is a very uncertain test).

We have not done to date any basal metabolic tests on these cases. This is something that will have to be done in clinics which are especially equipped for this kind of work. How the administration of glucose alone, or the administration of insulin alone, or with glucose, causes a rise in the alkali reserve I do not think anybody knows. I do know that when a rabbit that has been fasted overnight and has a blood alkali reserve of about 60 volumes per cent, is given enough insulin to throw the rabbit into convulsions, blood taken after a convulsion has shown its alkali reserve increased to 90 volumes per cent. Why this occurs is going to require considerable investigation.

As far as vomiting patients with hydatid mole, etc., are concerned, they are, of course, extremely interesting cases and the problem which I think would arise might be that the rapidly-growing hydatid mole, which is made up of the same, or similar, kind of tissue as the placenta in normal pregnancy, might have a similar effect on metabolism as normal pregnancy has.

Concerning the amount of glucose to be given Dr. Bailey was good enough to say a few words to me before he asked the question. It seems that men have not courage enough, or for some other reason do not want to give large enough amounts of glucose to these patients. It is extremely important that large amounts should be administered, and these figures which I have given as to the amount of glucose and insulin that we now administer were not arrived at suddenly. We did not care to give glucose intravenously to these sick people without being extremely careful about it. At first when small amounts of glucose and insulin were given no good effect resulted. We gradually increased the doses of both of these substances and now we know we can get results. As an example of this in another type of patient, we have given 100 grams of glucose twice a day for three days combined with 30 units of insulin (200 grams of glucose and 60 units of insulin) to a patient after partial gastrectomy for carcinoma of the stomach. She was over sixty years of age, was very much emaciated and received all her nourishment and fluids during this interval into her veins. Her pulse did not rise above 80 after the operation. Therefore so far as the carbohydrate metabolism is concerned, we think it is possible to feed a patient almost indefinitely into the veins with carbohydrates and this is certainly possible if insulin is given also.

Dr. Bailey mentioned the possibility of danger from giving glucose solution intravenously. We also nearly had a disaster. We had been administering glucose intravenously for years before the discovery of insulin and had been able to determine what glucose does alone and what it will do with insulin, for example, in preparing patients for operation. We were preparing a patient for operation by giving her some insulin and glucose and she almost died. We could not tell whether this was caused by the insulin or by the glucose, but thought it was the effect of the insulin although we had never had such a reaction before. A second patient had a similar reaction and then an opportunity came to give some of the glucose solution to another patient without insulin and she had a similar reaction. Therefore this was caused by the glucose. In some unaccountable manner the glucose had been contaminated with camphor. We use Merck's C. P., but it may become colored. If the autoclaved solution has even the merest trace of color it is immediately thrown out. Since then we have given hundreds of glucose injections, many of them without insulin, but certainly there have been fifty or one hundred patients who have received glucose and insulin and we have never had any other accidents. The worst that occurs is a rise of one or two degrees of temperature, such as may occur after intravenous medication of any sort.

The question of acidosis of eclampsia opens up a tremendous subject. Here the picture is complicated by renal involvement, disturbance of the salt metab-

olism, etc. We gave insulin to one eclamptic with an alkali reserve of 33 and she was only partly benefited by one injection of glucose and insulin. In her case various other methods were used and she recovered. Nevertheless immediately after three hours during which the glucose solution ran into the vein, the blood alkali reserve rose from 33 to 43. We have not tested the temperature of the glucose solution as accurately as Dr. Ward has. The hot solution with which we start, runs rather slowly and has time to cool off in the tube but we keep the solution warm with a flexible electric pad which folds over the tube and a glass connecting piece in the tube.

DR. GORDON GIBSON presented a report on the **End-Results with the Emmet-Baldwin Operation for Procidentia**. (For original article see page 637.)

#### DISCUSSION

DR. JOHN O. POLAK.—The principle of putting the cervix back and holding it back is the principle that cures prolapse, because if the cervix is in the hollow of the sacrum and can be kept there, by whatever method is used, the uterus will not come down.

DR. GEORGE G. WARD, JR.—I have not as yet done this operation, although it originated in the Woman's Hospital, and in the record room today we have the original volume of histories which shows the beginning of this operation in drawings made by Dr. Emmet. The two lateral denudations down the anterior vaginal wall for the cure of cystocele are plainly shown in that original volume of histories, and later on Dr. Emmet's modification.

It seems to me that we should not lose sight of the fact that this operation is really Dr. Emmet's contribution to gynecology as far as prolapse goes and it should be at least known as the Baldwin-Emmet operation. As far as the modifications by Dr. Baldwin are concerned, as I see them, the principle is still Dr. Emmet's. Suturing the edges of the denudation with catgut first, then passing the silver wire sutures are the chief modifications. One can see that that spreads out the denudation and makes a more certain broad apposition, a more perfect apposition when the silver wire sutures are passed, and is undoubtedly a distinct improvement.

DR. GORDON GIBSON.—Those of us who worked with Baldwin and were enthusiastic about this operation called it the Baldwin operation, but it really was the old Sims-Emmet operation, although Baldwin's modifications of it made it much easier to do by bringing denuded areas together and spreading out surfaces so that they lie right there in front of you.

The other modification was that Dr. Baldwin took a very much deeper bite of the tissue than either Sims or Emmet. They simply picked up the edge of the fascia and the mucosa without underlying the whole area.

In regard to the other point about the cystocele: if you think for a minute what happens to a bladder when a woman develops a cystocele you will realize that the trigone is stretched and spread out, and in doing it this way at first there is a slight puckering of the vaginal mucosa, but that disappears within a very short time and it is a very rare thing to have any dysuria or any trouble with the bladder at all.

To Dr. Halsted I would say that it is interesting to see these cases afterwards: the uterus stays in position. While you are doing the operation, the minute you stitch the cervix back with the patient in the Sims position and slight Trendelenburg, the fundus falls forward. Most of these cases are past the menopause,

and the uterus is about one-third the size of the cervix. So far as subsequent delivery is concerned, in cases that become pregnant any difficulty in this respect is obviated by cutting the bridge which remains and in that way the patient is able to go through normal delivery.

As far as the secretion is concerned, we have never seen any trouble from that. A little tunnel is formed and what secretion there is there runs out.

To revert for a moment to what Dr. Halsted said: it is not necessary to tell the patient she must have a cesarean section. There have been a good many women who have been delivered normally after this operation. I have one case where the doctor did not recognize the condition. If you do, it is very easy, as I have said, to cut down that bridge and she can be delivered in the normal way. I have two cases that delivered themselves normally, without any trouble.

The whole secret of the operation, of course, is the silver wire. Catgut will cut out; it will give way long before you want it to. One of the questions that almost everybody asks is why silkworm-gut is not used. The reason is because it also cuts out. Silver wire stays in the tissue. Sometimes the tissue heals over it and at the end of four or six weeks when you want to remove it it is hard to find. Unless you have seen how it acts in the vagina it is hard to believe that, but, nevertheless, it is true. The trick is in properly twisting and shouldering it. That is something one must learn.

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## OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF DECEMBER 4, 1924.

THE PRESIDENT, DR. EDMUND B. PIPER, IN THE CHAIR

DR. EDWARD H. RICHARDSON (*Associate in Clinical Gynecology, Johns Hopkins University Medical Department*), read a paper entitled **Three Types of Ureteral Pathology Encountered in Women.** (For original paper see page 678.)

### DISCUSSION

DR. FLOYD E. KEENE.—Dr. Richardson emphasized the value of urologic studies in gynecologic diagnosis. I am most thoroughly in accord with him. Symptoms referable to impaired bladder function are very commonly present in gynecologic cases; while most commonly these symptoms are due to pathology of the urinary tract secondary to pelvic pathology, we frequently find that there may be a coincident lesion in the urinary tract or the gynecologic lesion may be of minor importance as compared to that in the kidney or bladder. The symptom common to all these conditions is deranged bladder function and an accurate interpretation and consequently intelligently applied treatment can be arrived at only by a thorough urinary study. We make it a rule that a cystoscopic examination must be done in every patient presenting bladder symptoms irrespective of the pelvic pathology and in numerous instances our efforts have been rewarded by uncovering lesions which otherwise would never have been suspected.

DR. RICHARD NORRIS.—I believe that Howard Kelly was one of the first to suggest the possibility of ureteral injury during pelvic surgery. I likewise have had some very interesting cases, one analogous to that reported tonight. The catheter straightened out the kink, relieved adhesions preventing spontaneous opening which subsequently occurred without any other operative procedure. I



have ligated ureters accidentally and had to reopen the abdomen within twenty-four hours. Before releasing the ligatures, longitudinal incisions in the ureters, to help identify them, were made and these incisions were not sutured. They closed spontaneously and the patient recovered promptly. I have had the ureter injured by enucleation of a parovarian cyst in the depths of the broad ligament with subsequent abdominal fistula that finally closed spontaneously. From the obstetric standpoint I have seen two cases of high forceps operation with deep tears which have produced adhesions, kinks and traumatic strictures which have been relieved by ureteral catheterization. So I agree with all that Dr. Richardson has said. Urology is an integral part of gynecologic work. It is a special study by men especially trained in this work. A great deal of this work, unless done in the most skillful way, is dangerous. Much injury has been done by indiscriminate study; infections have been introduced into the urinary tract, particularly by men who are not expert.

DR. GINSBERG.—Very often we meet cases with renal calculi on one side and all the pain on the opposite side. The case reported in which rupture of the pelvis of the kidney had occurred was rather surprising to me as I did not know it was possible by the gravity method. The fact that urologic cases are often operated on for some other condition is sometimes brought out at the Jefferson Clinic. In the gynecologic department it is not unusual to see patients who have been operated for salpingitis or chronic appendicitis, when after thorough examination the trouble is found to be in the ureter or kidney. I do not believe I am exaggerating in saying there is hardly a week in which we do not see patients in whom some form of abdominal operation has been performed and who come to us with the same pain complained of previous to operation and we often find the trouble to be in the urinary tract.

DR. GEORGE M. LAWS.—I should like to ask about the plastic operation for reconstruction of the lower end of the ureter. Some years ago, in looking up methods of dealing with an ureterovaginal fistula, I found a similar operation described by Dr. Kelly as feasible. In Dr. Richardson's case the ureteral end of the fistula was one and a half centimeters above the ureteral meatus. In my case it was much higher and the operation was not attempted.

The case with hematuria on one side and stricture on the other is particularly interesting because it showed beyond doubt a definite cicatricial condition. At Dr. Hunner's visit to Philadelphia recently, doubt was expressed as to the pathologic findings in the stricture area. I think we all have accepted cheerfully the idea that strictures are common and Dr. Hunner's principles of treatment but we need more demonstrated proof of the actual pathology as encountered at operation.

DR. STEPHEN E. TRACY.—Dr. Richardson's paper emphasizes several points.

First: That patients with obscure lower abdominal and pelvic symptoms should have a thorough investigation of the renal system. We all agree with Doctor Richardson that cases of ureterovaginal fistula following hysterectomy, unless they close spontaneously within a short time, should be operated upon and dealt with according to the conditions present. I have always felt that a spontaneous closure of an ureterovaginal fistula was accomplished by the scar tissue closing off the ureter with the loss of function of the kidney.

Second: The danger of injecting fluid into the pelvis of the kidney for the purpose of making pyelograms. There is no doubt that many kidneys have been seriously damaged as a result of this procedure. The gravity method which Doctor Richardson used is undoubtedly the safest, but even this is accompanied

by considerable risk as was evidenced by his case. It requires little pressure to force the fluid from the pelvis all the way through the substance of the kidney. We have done this deliberately on a few patients on whom a nephrectomy was to be performed. A day or two before the operation, the ureter on the diseased side was catheterized and fluid injected into the pelvis with only a moderate pressure. At operation, part of the fluid was found between the kidney and the capsule.

Third: That it is important to investigate both sides as it is a well-known fact that the symptoms may be on one side and the pathology on the opposite side.

DR. EDWARD A. SCHUMANN.—There is one point in Dr. Richardson's case not clear to me; that is hematuria on one side and stricture on the other.

DR. RICHARDSON (closing).—The treatment of ureteral fistulae varies according to the location and type of pathology with which one is dealing. The invaginating operation employed in my case is applicable only to cases in which the fistula is close to the bladder. The important point to be borne in mind is that besides the fistula there is practically always an associated ureteral stricture to be dealt with by repeated dilatations, if cure is to be effected. The advisability of attempting conservative treatment where the fistula is high up in the ureter must be determined by the exercise of good surgical judgment. Each case presents specific problems and no blanket rules can be laid down.

With reference to the question of the explanation of the hematuria in my second case, I am also in the dark. The most exhaustive study of the right side revealed nothing more than a scarcely perceptible narrowing of the ureteral lumen within the bladder wall, and yet all of the bleeding came from this side, being repeatedly associated with violent attacks of renal colic. Both the hematuria and the acute attacks subsided after the stricture on the opposite side was successfully treated.

I have not seen any instances of ureteral fistulae following the use of radium in the pelvis. Vesicovaginal fistulae from this cause are far commoner.

In conclusion I wish to sanction all that Dr. Keene said about the intimate association between female urology and gynecology, and to make a plea for the more frequent use of the cystoscope in the routine diagnostic study of women.

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## NEW YORK ACADEMY OF MEDICINE

### SECTION OF OBSTETRICS AND GYNECOLOGY

MEETING OF JANUARY 27, 1925

MISS CAROLYN C. VAN BLARCOM presented (by invitation) a paper entitled **Provisions for Adequate Maternity Care in the United States.** (For original article, see page 697.)

DR. FLORENCE MCKAY, Albany, N. Y., presented (by invitation) a report on **What New York State Is Doing to Reduce Maternal Mortality.** (For original article, see page 704.)

DR. AUSTIN FLINT discussed **The Responsibility of the Medical Profession in Further Reducing Maternal Mortality.** (For original article see June issue.)

#### DISCUSSION

MISS ALTA DINES.—The Association for Improving the Condition of the Poor was incorporated in 1843, pledged to care for the health, as well as the other family welfare problems of those who came under its care.

For many years the work was done by volunteer workers. Then in the nineties they began having paid workers; but these visitors soon discovered that they really didn't know enough when there was pregnancy; what to advise the mothers as to their proper care. Therefore, in 1907 this organization started prenatal work, the first, I believe, in New York City.

Pregnancy has always been a very prominent problem to meet in family welfare work. In 1925, out of 5,106 families cared for there were 1685 expectant mothers, or about 37 per cent of those families.

In the Italian section we have a population of about 35,000 people, and during 1923, it was found that 77.3 per cent of the deliveries were midwife deliveries. This indicated a very special need for prenatal work. The A. I. C. P. nurses gave to 58 per cent of those who were delivered of babies, prenatal care.

In the colored district there is a population of about 50,000. Here 94 per cent of the mothers delivered of babies were under the care of the A. I. C. P. for prenatal service. There is a very special problem there, namely, the great complication of venereal disease, and of the total number of births in that district almost 25 per cent of the women had syphilis. Here we have a different picture. Only 1.7 per cent of those colored women are delivered by midwives; 94.2 per cent are delivered either in the hospitals or by the outpatient services of the hospitals. We have had startling results. The mortality rate has decidedly decreased in the colored district. In the Italian district the maternal mortality was already low, but there has been an improvement of 10 per cent in the infant mortality in that district in five years. They did need and they do need to be taught how to care for the babies when they come into the world. Of course, the stillbirths and other difficulties coming from syphilis have been very marked in the colored district.

DR. FREDERICK W. RICE.—I do not think there is any question that those who have studied this matter of reducing the high maternal mortality, will agree with Dr. Flint when he says that education of the public must come first, and then, with the education of the public in this subject and the demand for better maternity care, will follow educated medical attention in these cases. However, I disagree with him when he says that we can get immediate results through the medical profession by giving them standards in the management of the normal case. I think it is a very difficult thing to educate the public, and I also think it is a very difficult thing to educate the large part of the profession, now practicing, to limit their practice to the normal case and avoid operative interference. I think the way it is now being attacked is going to give results in the next five or ten years, that is, by means of the work that is being done through the states, by the Sheppard-Towner Bill organizations such as the maternity centers and organizations connected with other welfare associations. It is through such agencies, through nurses reaching the mothers, that they are going to realize the importance of carrying out the rules of hygiene in protecting them through pregnancy.

As far as sepsis goes, I think it is going to be some time, simply from the

fact that none of these organizations, state, federal or local, has anything to do with the actual delivery of the case. They can protect the mother through pregnancy and tell her how to take care of herself so as to avoid toxemia of the severe type but when the actual delivery comes, that is when sepsis occurs. In the last ten or fifteen years, in England, where the number of midwives has increased perceptibly, the number of doctors called in by midwives is increasing all the time, and I think, until we actually supervise and weed out these ignorant women who are practicing in the Southern states and the scattered districts, we are going to have a continuously high sepsis rate. I believe that work can only be done through trained nurses, but much differently trained than the nurses described by Miss McKay. They must go out not as midwives, but as instructors of midwives, and I think until that time comes we will not get results.

DR. HAROLD C. BAILEY.—It occurred to me while Miss Van Blareom was talking about the differences of nationalities and of distances in our country compared with others abroad, that that possibly offers a very easy explanation for us, but, as a matter of fact, from actual figures in our own state, we find we are 20 points below some others in the United States Government registration area. Therefore, we can hardly claim that the mountain whites and the colored women increase our mortality as much as we would expect that they do, and therefore we will have to find some other way to explain this high rate.

New York is the best city, or was, in the last two or three years, in the country according to the records, as regards maternal mortality and still the rest of the state has a figure which is considerably higher. Consequently if our teaching only takes care of those immediately about it, we are doing very little good.

There is another point, namely, the division of the responsibility. We have, of course, the midwife, the doctor, and the hospital. Here in our own town we have reduced the incidence of midwives from 40 to about 20 per cent within the course of a few years, the last report showing that there were only 27,000 midwife deliveries in the city as against some 49,000 ten or twelve years ago; so it would seem as if the midwife, as a problem in this particular city, did not enter very much into our discussion. At any rate, she is a recognized and supposedly trained person, and she handles only normal cases.

I think there is no question that the doctor who practices general medicine and takes obstetrics as a side issue is the man at fault to a very considerable extent, and if we follow what Dr. Flint has suggested and demanded, or if the public follows and demands what he has suggested, namely, that surgery be done by surgeons, we very likely would have the abnormal and delayed labor cases removed to the hospital for care by those who are trained and competent to handle such cases.

DR. FREDERIC C. HOLDEN.—Notwithstanding our improved educational facilities, prenatal care, theoretical and practical training, we have increased our maternal mortality. Why? A large group of medical men will never be obstetricians. They know the theory of obstetrics, but they have no mechanical common sense to make a combination of the theory and the practice.

DR. RALPH W. LOBENSTINE.—Regarding medical education: in the first place, all medical students should be taught the value of prenatal care, even though the maternal mortality has not improved. I myself question that fact despite our statistics. I think maternal mortality has improved and that the reason it apparently has not improved is because we are getting more accurate statistics. Secondly, Dr. Flint brought out that conservatism is the point that

the medical student and the older doctor must always have in mind, unless he is a specialist, and he should practice conservatism up to a certain point, but you cannot compare the work of the specialist and the internist in obstetrics any more than you can in surgery. Third, in order to improve medical teaching you must have more autopsies, particularly of babies.

Just a word from the public health standpoint. In rural communities the greatest blessing, as I have often said before, outside of the doctor at the actual delivery, to the poor woman, is the nurse. If you get outside of this small environment of ours, where we have every facility, and that of cities like Boston, Philadelphia and Chicago, the facilities are very bad, and that is true of all rural centers where we have great distances and few doctors, and under such conditions what is a poor woman to do unless she has a nurse there to help? If she cannot get the doctor she must have some member of the family to help her out. The next step in attacking this problem in the rural districts is in the specially trained nurse, or the nurse trained in a specialized subject like obstetrics.

One or two things must happen in the country if conditions are going to improve. We must have nurses, with an obstetric training to help out the doctors in those districts. It is all very well for us to say that the communities have plenty of doctors and the roads are good and doctors have automobiles and they can get to the patients. They cannot do it. Miss McKay will tell you that they cannot do it, despite reports to the contrary. If you have scattered throughout the country certain groups of these specialized nurses who can get to the patients when the doctor cannot and will stay there until the doctor arrives, conditions may be improved.

The third and last thing that I want to touch upon is this: if you can get more hospitals to serve two or three counties where the population is not large, then with a system of motors, etc., you can get the abnormal cases easily to the hospitals and thus improve conditions.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

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### A REVIEW OF THE GYNECOLOGIC LITERATURE OF 1924

By SYDNEY S. SCHOCHET, M.D., AND JULIUS E. LACKNER, M.D., CHICAGO

AN almost marvelous development of knowledge in the domain of medicine has taken place during the past decade, with its numerous channels extending into every branch of the medical sciences. During the same period, and especially during the past year, the speciality of gynecology has shown even more readiness to adopt new views and new methods of examination, with the result that the careful clinical study of patients, with its traditional time tried methods, is replaced with too many laboratory tests. The great dangers attending this revolutionary development in gynecology are, that discovered facts will be accepted too freely as explanatory, when in reality, they do not explain. As a result, investigation and real progress in gynecology will finally be hampered instead of aided.

Aside from the suggested teachings of the workers in the biochemical and fundamental subjects, who have over-evaluated proposed methods in gynecology, there are still other men of real worth and whose high authority and exact knowledge we recognize, who have suggested the *passing of the gynecologist per se*. John B. Deaver<sup>20</sup> in a recent paper discusses the *passing of the gynecologist*. While the general surgeon continues to invade the pelvic regions in the removal of tumors, or in the performance of hysterectomies, there is no doubt that plastic surgery of the female genitalia requires the more exact skill of specifically-trained men, which the average general surgeon does not possess. There is no teaching more dangerous than to encourage the general surgeon to invade the pelvic brim. Cullen<sup>18, 19</sup> and Hirst<sup>44</sup> have clearly presented the great advances made by gynecologists, not only in the treatment of pelvic lesions, but in surgery of the bladder, and emphasize the necessity of more careful training of men in this speciality, as illustrated in a sketch of the life and work of David Tod Gilliam.

While the recent advances in biochemistry and allied subjects have established numerous facts, which no amount of unwillingness to believe can set aside, yet the actual clinical value of these tests, employed by the modern gynecologists, has not been properly evaluated, with the result, that many misconceptions have grown through incomplete and partial knowledge of the allied sciences. The importance of basal metabolism, blood chemistry and studies of physical condition of blood

cells have received special emphasis by many gynecologists during the past year, yet a word of warning as to their proper clinical evaluation is not amiss in a review of this character.

Hafkesbring and Collett<sup>39</sup> have shown the marked variations of the daily basal metabolism of two individuals over a period of four months. The maximum variations were plus 12.8 per cent and minus 9.5 per cent in one patient and plus 8.8 per cent and minus 14.4 per cent in the other patient. Studies of the variations of blood sugar content of patients with different pelvic lesions, both before and after operative procedures, were made by Paroli.<sup>70</sup> While the results are interesting, their value should not be overemphasized. Likewise many investigations of the sedimentation of blood cells have been recorded, and employed as an index in the prognosis and operability of a case. Burckhardt-Socin<sup>10</sup> calls attention to the nonspecificity of this reaction. However there appears to be some relationship between rapidity of sedimentation and tuberculosis. Yet it should be born in mind that even physiologic processes, as menstruation and pregnancy, influence sedimentation. Becher Rüdendorf<sup>3</sup> concludes that the test at its best is of diagnostic value in a limited number of diseases, while Hildebrandt<sup>43</sup> believes, that it is of real value in inflammatory lesions, but may fail completely in diseases which are accompanied by great destruction of cells, and is of little value in ectopic pregnancy. On the other hand, Flores,<sup>27</sup> in a study of 100 clinical cases, concedes a great diagnostic value to this test for inflammatory processes, tubal pregnancy, and in the differentiation of benign and malignant tumors.

If the reader recalls the fact that the more exact serologic fixation tests for syphilis have replaced the hundred or more different precipitation tests advocated in the diagnosis of syphilis, it is evident to the gynecologist that we should at least await further improvement or modifications of this sedimentation test before we add it to our armamentarium.

The subject of endocrine disturbances which received much attention in the literature during the past five years, due in part to unfortunate commercial exploitations, has not been placed on more sound grounds. Robert T. Frank<sup>31</sup> concludes that the critical and honest worker in endocrinology must sorrowfully confess that in far too many instances, he is still impotent to relieve endocrine disturbances. Thyroid extract is the sole endocrine product which fully substitutes for the action of an endocrine gland. Pituitrin is of use in but few endocrine disorders, namely, diabetes insipidus and in some cases of functional uterine bleeding. Frank thinks that the exalted results claimed from the products of the ovary, namely whole ovarian extract, corpus luteum, ovarian residue etc., are no more than a striking evidence of mass hypnotism.

Chemotherapy and vaccinotherapy have few enthusiasts as evidenced by a dearth of the reported cures from these therapeutic measures; although Chevrier, Fumery and Dausse,<sup>12</sup> in a very extensive paper, have reported 80 per cent cures in fifty cases with autovaccine therapy. But these views are at variance with many other workers in this field.

The symptom of pain, not essentially associated with any gross pathology in the pelvis or very slight errors in the pelvic organs, is no longer subjected to speculative operative measures. The trend of

thought during the past year, is to consider these unfortunate patients with anomalies of a mental make-up. Smith<sup>91</sup> considers two factors as the cause of pain in the neurotic woman: (1) Oversensitiveness of the patient; (2) a faulty conception of the mind of the patient as to the integrity of her sexual organs. Ries<sup>77</sup> in a recent paper on "that pain in the vagina" concludes that the sex organs are secondary to an abnormality in a mental constitutional make-up. Heinsius<sup>41</sup> considers that many gynecologic symptoms of this group of cases are due to a disturbed relationship of the vegetative nervous system, especially of the parasympathetic system. From the many conflicting views of pain in the neurotic individual, we arrive, therefore, at this, that mere theories do not offer an adequate explanation of these symptoms, nor does it seem advantageous to assign these apparently functional disturbances to one common group.

Heaney<sup>40</sup> reports 439 administrations of ethylene and oxygen in his gynecologic and obstetric practice. Of this group, ether was required in 111 cases. Heaney concludes that this anesthetic is without an equal for diagnostic examinations that require anesthesia, and is of special benefit to the patient who is a peculiar surgical risk, particularly the patient requiring cesarean section. The quickness of the induction, the freedom from struggling and asphyxia are very important in these cases. The child cries promptly and the uterus behaves as when nitrous oxide is given. Magid and Klein<sup>56</sup> report a series of cases under sacrotranssacral anesthesia and conclude that this form of anesthesia should be employed more often in plastics. Fritz Peyser<sup>73</sup> calls attention to the fact that women are more susceptible to an anesthetic than men, and are not so well suited for the administration of local anesthesia. Unpleasant after-effects following lumbar anesthesia have been observed much more frequently in women than in men. One of us<sup>80</sup> observed a death from spinal anesthesia in one of our well-known teaching institutions. No definite lesions were present to explain the sudden death other than the form of anesthesia.

Miller<sup>62</sup> reports a case of construction of an artificial vagina with the Baldwin operation. Although the results from the marital viewpoint were reported satisfactory after a period of two years, Miller questions whether one is justified in advising so radical an operation in similar cases.

Morrer<sup>66</sup> reports excellent results in the treatment of pruritus ani and vulvae with the infiltration of the areas with quinine and urea hydrochloride solutions in strength of 0.5 per cent. The author states that the results with this method are as good as after a Ball or Lynch operation and much better than those obtained with actual cautery. Lackner<sup>56</sup> failed to obtain any relief with this method or with novocaine solution in a series of ten cases.

Montague<sup>64, 65</sup> made a bacteriologic study of pruritus in a series of 44 cases of which 20 had rectal diseases in which pruritus of the anus was absent; 14 had pruritus without rectal pathology. In addition five normal persons were examined as controls. The striking findings, were that of 1700 sections of tissue examined, bacteria could only be demonstrated in 74 of the sections. From this study the author concludes that the staphylococci and *B. coli* were the probable infective agents in pruritus of the perineum.



Schochet<sup>87</sup> has made a very careful study of granuloma inguinale with the report of a case. The author emphasizes the necessity of more careful study of ulcerations of the external genitalia, and collected sixty-four reported cases of this tropical condition observed in the United States during the past five years.

Tourneaux<sup>94</sup> reports a case of kraurosis vulvae. Although few reports and studies are found in the current literature, this condition is not uncommon in hospital dispensaries. The writers<sup>54, 86</sup> of this review observed several cases in the Michael Reese Hospital Dispensary during the past year. In some cases ovarian therapy gave slight relief. However if we remember the pathology of this severe affection, an atrophy and fibrosis of the connective tissue beneath the epithelial layer, radical excision of the vulva is probably the only real cure of these unfortunates.

Goldstine and Fogelson,<sup>34</sup> in a very careful and extensive study of adenomyoma of the rectovaginal septum, have arrived at a similar conclusion with R. Meyer, namely, that these growths are of an inflammatory origin even though glandular structures are often present in regions of apparently aseptic areas.

#### CERVIX AND UTERUS

Some of the remarkable findings reported for uterine secretions must be totally beyond the comprehension of anyone possessing an extensive gynecologic experience. Isador Kross<sup>53</sup> reports a fibrinolytic ferment present in the uterine secretion that makes the uterine menstrual flow fluid. It is common knowledge that the normal menstrual discharge consists of large amounts of mucus with very finely microscopic clotted blood from the uterine vessels of the mucosa. Failure to recognize this fact has led to erroneous conclusions as to variations and consistency of menstrual blood. While most textbooks state that menstrual blood does not coagulate, a careful microscopic examination of the menstrual flow will clearly demonstrate that this view is untenable.

The treatment of leucorrhea in children and adults has been the cause of a great deal of comment during the past year. Kahn<sup>49</sup> considers that vulvovaginitis in children should be treated by autovaccination and by local treatment. Stein<sup>22</sup> gives daily injections of one per cent mercurochrome ointment into the vulva and vagina and reports cures in gonorrheal vaginitis of children in seven to nine weeks; in nonspecific leucorrhea in five weeks. C. Tenconi<sup>93</sup> injects one per cent silver nitrate solution into the vagina, under pressure, every second day, with reported cures after fifteen injections in gonorrheal infections; after two or three administrations in nonspecific infections. We must conclude from these reports, that there still exists a difference of opinion as to curative methods in the treatment of vulvovaginitis.

The cervix may act as focus of infection just as the teeth, tonsils and appendix. Laura Moench<sup>63</sup> presents evidence to show the affinity of cervical streptococci for joint tissue. It is evident then, that the treatment of this site of infection is of some importance. During the past year, three distinct methods of treatment were frequently advocated. Sturmdorf's<sup>92</sup> enucleation of the cervix is the first, and one of the most successful. According to Kelly,<sup>51</sup> Guy Hunner's actual cautery

of the cervix is the best treatment of endocervicitis because it does not cause an ascending infection nor cicatricial stenosis of the cervix and it gives excellent results. Corbus<sup>15</sup> has devised an instrument whereby the cervix is exposed to 116 to 117° F. for thirty to forty minutes every ten days in treatment of gonorrheal endocervicitis. The French<sup>38</sup> report success in the treatment of endocervicitis with Filhos caustic,<sup>25</sup> (potassium hydroxide 5 parts, and quicklime 1 part), but this treatment must be followed by a rest in bed for several days. It is often followed by stenosis of the cervix, and the cervix must be dilated from time to time after cauterization. In Pemberton's<sup>71</sup> report of 18 cases of atresia of the cervix, 3 had cervical repairs, 1 tight external os due to cicatricial tissue, 1 obstructive membrane at the external os, 1 with pin point os, which was associated with tuberculosis of the uterus; vaginitis was present in 7, cervical polyps in 4. Malignancy was not present in this group.

The literature of the past year shows that there still exists a marked difference of opinion in the treatment of fibroid tumors of the uterus.<sup>98</sup> Fibromata which do not increase in size or produce symptoms, especially when discovered at the time of the menopause, are better let alone. Schickel<sup>83, 84</sup> believes surgical interference is indicated in the following groups: Fibromata compressing neighboring organs, associated with inflamed processes; fibromata complicating pregnancy, especially pendunculated subserous fibroids; tumors which occupy a large part of the pelvis or abdominal cavity; rapidly growing fibromata and those accompanied by severe hemorrhage. He also includes fibromata treated without success by radium and x-ray. Bégonin<sup>4</sup> is of the opinion that radiotherapy is indicated only in fibroid tumors of the menopause, provided they are interstitial and not complicated with other lesions. Radium has certain advantages over x-ray therapy because it is more active and usually requires but a single application. Its insertion necessitates dilation of the cervical canal which may reveal important contraindications to radiotherapy. Seitz and Wintz<sup>89</sup> believe that all types of fibromata of the uterus, with the exception of pedunculated polypi, should be treated by the roentgen rays. George Willis<sup>95</sup> gives the following indications for radium treatment of fibromata of the uterus; small nonpedunculated fibroids at the menopause with hemorrhage as the most salient symptom, and especially in cardiorenal patients in which surgery is contraindicated. Cuthbert Lockyear<sup>55</sup> states that 55 per cent of fibroids require no treatment, 35 per cent require surgical removal and 10 per cent may be treated successfully with radium.

In the operative treatment of fibromata of the uterus, the question of conservative and radical operation is of special interest. C. Jeff Miller<sup>61</sup> states that myomectomy should be performed more frequently. The mortality is not greater than hysterectomy with only one recurrence in fifty cases. Pregnancy occurred in 28 per cent of the cases with myomectomy. Goullioud<sup>36</sup> states that myomectomy gives an average of ten years of normal genital life during which pregnancy may occur. Schickel<sup>84</sup> maintains that enucleation is justified only when there is a solitary subserous fibroid. Myomectomy is not indicated in multiple fibroids because of the risk of uterine rupture.

Gynecologists continue to differ as to the operation of choice in regard to total and supravaginal hysterectomies in the surgical treatment of fibroma of the uterus, because of the frequency of carcinoma

of the cervical stump. According to C. J. Miller,<sup>61</sup> the above operations are equally safe in the hands of an experienced operator, but there is less danger of injury to the bladder or ureter in supravaginal hysterectomy in the hands of the less experienced surgeon. William Fletcher Shaw<sup>90</sup> believes that supravaginal hysterectomy is indicated in a nulliparous uterus and in multiparous uterus in which there is no damage to the cervix. With the repeated reported cases of carcinoma in the residual cervix, it is evident that total hysterectomy is indicated more often in the presence of chronic endocervicitis, and severe cervical lacerations.

Textbooks<sup>1</sup> continue to emphasize chronic myocarditis and degeneration of heart muscle, as characteristic of the "myoma heart," associated with fibromata of the uterus. Winter<sup>96, 97</sup> concludes that the involvement of the heart in myoma is not uniform and that there are no evidences of heart changes which are pathognomonic of myoma and he even questions the existence of this condition.

It is evident, from the many conflicting reports of the treatment of carcinoma of the uterus, that this chapter in the field of gynecology remains an academic question. In the many papers published during the past year, we still lack a clear conception of the method of choice for the treatment of this condition. The treatment of corpus carcinoma cannot be considered with the treatment of carcinoma of the cervix, for, it is a matter of common knowledge that the clinical courses of these two conditions are entirely different. We have in the latter condition (carcinoma of the cervix) early extensive metastatic involvement of the lymph nodes, while in carcinoma of the corpus, the tumor growth remains localized for a much longer time. In carcinoma of the fundus, Norris and Vogt<sup>68</sup> recommend panhysterectomy with postoperative irradiation with radium and x-ray.

European authorities, especially the French<sup>8, 9</sup> and Italians, advocate strongly the use of electrocoagulation with the diathermic current in conjunction with irradiation in the treatment of carcinoma of the uterus. Coagulation by diathermy is better than by thermocautery as it penetrates deeper, the tissues are sterilized with the high temperature of the electrode, and the destructive action extends far beyond the eschar into the neoplastic mass. Secondary hemorrhages are not encountered.

Ursus V. Portmann<sup>74</sup> concludes that the treatment of carcinoma of the cervix will be confined to radiation therapy. Radium<sup>47, 48</sup> is of value in operable cases of carcinoma of the cervix and is employed more and more often in the early cases, according to Thomas and Jones. John G. Clark,<sup>13, 14</sup> at the University Hospital of Pennsylvania, reports good results in the treatment of carcinoma of the cervix with radium. According to his conclusions, radiation and surgery have given equally good and bad results. Radium is a palliative remedy of inestimable value in a small percentage of cases. Robert Greenough,<sup>37</sup> member of the committee of the American College of Surgeons, on treatment of malignant diseases with radium and x-ray, arrives at the following conclusions. He reports 829 cases of carcinoma of the cervix of which 94 were free from the disease after three or more years. More than one-half of these cures were obtained by use of radium and x-ray without radical operation. There were no cures with cautery alone. Of the 243 cases that were included in the favorable or borderline groups, hysterectomy cured "one in

three" radium with cautery "one in three" and radium alone cured "one in five." The final conclusions were:—The method of choice in the treatment of malignancy of the uterus remains an open chapter in gynecology.

Gosset and Menod<sup>35</sup> value the wide abdominal hysterectomy in early cervical cancer. George Crile<sup>16, 17</sup> emphasizes the necessity of individual study of each patient in the treatment of malignancy of the uterus. An extensive correlation of the experience of individual observers is necessary to establish a correct basis of judgment regarding the relative merits of surgery, radium, and roentgenotherapy in the treatment of carcinoma of the uterus. Joseph Schulte<sup>88</sup> writes that many clinicians are using a combination of the improved operative technic plus intensive postoperative radiation. Bumm<sup>88</sup> reports 71.8 per cent cures in operable carcinoma of the cervix with this method.

Henry Schmitz,<sup>85</sup> in reporting five-year end-results in primary carcinoma of the pelvic organs, draws the following conclusions: When carcinoma of the cervix is localized, surgical interference is the method of choice. When there is doubt as to definite localization of the carcinomatous growth and surgical means are used, they should be preceded by radium and x-ray treatment. However, radiation therapy, without subsequent surgery, gives better permanent results in cervical carcinoma. Radium and x-ray therapy is the method of choice in inoperable cases and these inoperable cases are treated symptomatically to arrest hemorrhage, foul discharges and to alleviate pain. According to Schmitz' final conclusions, radium therapy of carcinoma of the female pelvic organs, compares favorably with surgical treatment.

In an editorial on carcinoma of the uterus, William Mayo<sup>57</sup> concludes that 71.8 per cent of patients free from lymphatic involvement are cured by operative measures and only 19 per cent are cured when lymphatic involvement is present. Radium is not indicated in patients with carcinoma of the body of the uterus, because radium rays do not penetrate deeply. No patient should receive radium treatment without surgical consultation and the decision as to surgery or radiotherapy should depend on the condition existing in each individual case.

We can only conclude from these authoritative reports that the treatment of malignancy of the uterus and the final method *par excellence*, must be deferred for some future period.

Only a passing note is given place in this review of the prominent chapters of the curative methods for displacements and retroversions of the uterus.<sup>80</sup> Watkins-Wertheim<sup>60</sup> interposition and the Ries operation are the operations for prolapse after the childbearing period. Many good gynecologists still entertain the idea that surgical operations are indicated for the harmless and symptomless movable uterus. Theilhaber<sup>40</sup> was the first to recognize that uncomplicated retroflexion *per se* causes no symptoms. Jaschke<sup>40</sup> in a series of 1000 cases demonstrates that it is inconsistent and untenable to hold retro-deviation responsible for any form of menstrual disturbance. Uncomplicated mobile retroflexion produces no characteristic symptoms.

It is evident that the first and the most urgent need in the study of cases of sterility is a very careful examination of the male and female parts. Even though the male spermatozoa are live and viable and the female parts normal, there still remains the question of

biochemical and biologic differences or incompatibility of the semen and ovum. Orłowski<sup>40</sup> calls attention to two other groups of individuals—the “frigid” woman and the “grande amoureuse.” In the first group, therapy is not successful.

Glaeyecke<sup>33</sup> refers to the value of intrauterine application of formalin in cases with mild endometritis and reports successful results in 65 per cent of these patients. In passing, it may be of interest to call attention to the marked edema of live tissues to the action of formalin.<sup>2</sup>

In a study of tubal patency, Bonney<sup>7</sup> alludes to the frequency of stricture or occlusion of the tubes although the routine tactile examination reveals normal organs. Huhner<sup>45</sup> has made a very extensive study of the diagnosis of sterility with the Rubin patency test and has supplemented this by determining the virility of the spermatozoa and the receptivity of the female genitalia. Immediately after coitus, the woman comes to the office, is placed in the dorsal position, a bivalve speculum inserted into the vagina, and the cervical contents are aspirated into a pipette and examined. If numerous live spermatozoa are present, the cervix is in the correct position to receive the semen. If only dead spermatozoa are present, and if a previously examined condom specimen revealed live spermatozoa, the secretions of the cervix are at fault. The Huhner test is a clear and well defined procedure that should be more frequently employed. Meaker<sup>59</sup> calls attention to a group of cases of sterility due to spasm of the muscular coats of the tubes. One of us (Schochet), in an operative case for fibroids of the uterus, was not able to produce contractions of the fallopian tubes with direct electrical stimulation. Meaker gives the following important cause for sterility in the female: that condition where the semen is not ejaculated directly into the cervical canal or external os of the cervix, due to redundancy of the vaginal walls, vaginismus or when the tip of the cervix points forward.

Many of the conditions obstructing natural insemination can be corrected. When this is unsuccessful, artificial insemination<sup>58</sup> is indicated. The conditions necessary for this procedure are normal spermatozoa and a female genital tract that is normal above the cervix. The time of choice for artificial insemination is immediately after a menstrual period. This procedure must be repeated at several monthly intervals before it can be considered a failure. Obstruction in the tubes can be positively diagnosed with the Rubin test.

Robert L. Dickinson,<sup>21</sup> in a very extensive and exhaustive study, analyzes the various contraceptive methods, and gives a detailed statistical report of procedures advocated: jellies, pastes and effervescing tablets containing chinisol and acids show a 3 per cent failure.

There is no doubt that the studies of the patency of the tubes have thrown much light on the subject of sterility, yet there remains a large field<sup>30</sup> for more careful study of sterility which will yield many more new facts capable of throwing more and better light upon the underlying causes of this condition.

“It is a wholesome experience in medicine from time to time to pause long enough to take stock of our knowledge in various departments of practice and to ascertain whether we are walking in the light of sound information or merely groping aimlessly in the darkness of ignorance.” (A. M. A.)

Probably no statement is more appropriate for the gynecologist when he wishes to discuss the physiologic and pathologic functions of the ovary. If we can once get oriented and understand the true physiology of the ovary, there will be no avenue open to the many writers on supposed ovarian functions, exhaustion, hyper- and hypoactivity with its supposed effect on the functional disorders of the mental and nervous system.

Kellner<sup>50</sup> describes many symptoms with many conclusions of a case of hypofunction of the ovary, as though we actually possessed basic physiologic knowledge of this organ.

Portze and Wagner,<sup>75</sup> in a study of ovaries in women with well-defined symptoms of dementia praecox (Schizophrenia) have found a definite fibrosis in these organs. All three cases showed erotic delusions and ideas of pregnancy. With the activity of the modern psychoanalyst, grave doubt is thrown on Freud's idea of sex as a satisfactory explanation of these conditions, nor should other mental disorders be attributed to the so-called cystic ovary. (Follicular cysts.) It seems more sound not to revive the old time-honored idea of associated functional mental derangements with the ovarian processes. Schickel<sup>81, 87</sup> in previous papers, concluded that menstruations are not controlled by the corpus luteum and maturing follicles and in a more recent contribution now even eliminates the rôle of the interstitial or "thecal" gland elements in hemorrhagic syndromes of the uterus. Schickel's studies are interesting and instructive, in that they prove that the function of an organ cannot necessarily be determined by apparently logical deductions.

Probably of greater clinical significance to the gynecologist is the action of the roentgen ray on the normal ovary and the subsequent effects of radiation on the physiologic functions of the ovary. Frankel,<sup>28</sup> Werner, Hynemann and others report no ill effects following roentgen amenorrhea, and that women gave birth to perfect, healthy children. However, a large number of gynecologists have objected to this temporary sterilization on account of the fear that the patients would give birth to inferior individuals. Frankel, in a very extensive study of this phase of sterilization concludes that a limited period of sterilization can be obtained with graduated roentgen ray exposures and if the dose is kept within proper limits, only the most mature follicles will suffer destruction with no injury to follicles in the earlier stages of maturation. This procedure is of value for individuals in which temporary sterilization is desired, especially in cases of cardiac, pulmonary and renal diseases, where repeated excessive bleeding is deleterious to the general health of the patient. However, it is questionable whether the roentgenologist can accurately graduate the dosage in all cases so as to have a stimulating effect on the so-called ovarian function as advocated by Holzknecht's followers, especially Thaler.

In a series of experiments conducted by Driessen<sup>24</sup> on the effect of roentgen rays on female gonads of rabbits, the author concludes that the x-rays are germ poisons which injure germ cells present in the sexual gland. Their effect is manifested by subsequent arrest of the development of the fetus, and by inferiority of the latter. The conclusions are contrary to the opinions held by various authors, and yet, it has been repeatedly shown in many human cases that,

after irradiation, pregnancy is apt to terminate in the premature birth of a dead fetus.

Kottmaier<sup>52</sup> reports three cases of pulmonary tuberculosis in which roentgen castration, carried out at one sitting, was followed by a marked aggravation and more rapid course of the disease. However the author does not advocate a general resumption of surgical procedures in this group of cases, but a more conservative roentgen sterilization in several exposures.

Saidman,<sup>78</sup> in a recent paper, has reported unusually good results with the ultra-violet rays in the treatment of ovarian disorders in doses which produced a mild actinic erythema. Reference is made to this paper so we may more clearly see the many inroads that are being made in the field of sound gynecologic practice.

Renewed interest in the nonsurgical treatment of ovarian and tubal infections is noticed during the past year. Fekete<sup>20</sup> reports marked improvement following the intravenous injection of calcium chloride, and notes alleviation even a few seconds after the intravenous injection. How much of this is due to psychotherapy? The theory of its therapeutic action is based on the assumption that calcium stimulates a flow of fluid from the tissues into the blood stream, thereby decreasing the local swelling of the inflamed part. The contraindications to calcium therapy are given as bacteriemia, absence of local findings, weakness and loss of strength.

Perie<sup>72</sup> emphasizes the employment of serotherapy, vaccines and protein therapy. The old idea of artificial production of leucocytosis also receives special mention in this paper and particularly the Klingmuller method of injection of turpentine into the periosteum of the ileum. This procedure produces a violent local reaction with an increase in the temperature, 39 to 40° C.

Marked constructive progress has been noticeable in the study of the solid tumors of the ovary.<sup>32</sup> Dougal<sup>5</sup> reports an interesting case of primary chorioepithelioma of the ovary and has collected ten cases of chorioepithelioma of the ovary from the literature. Newmann<sup>67</sup> reports an unusual case of carcinoma folliculoids or folliculoma of the ovary and discusses the many diversities of opinion as to the true nature of this type of tumor. Aschner and Meyer<sup>67</sup> believe that these tumors arise from residual granuloma cells. Clinically, they belong to the malignant blastomas. Bishop<sup>6</sup> made a thorough survey of the literature of solid ovarian tumors and has arrived at the conclusion that at best, these tumors are difficult to diagnose as to malignancy and has taken a somewhat extreme view in advising radical extirpation of all types of solid tumors of the ovary.

Cahill<sup>11</sup> calls our attention to the relative frequency of pelvic tumors in children under three years of age. A large number of ovarian tumors found in children are dermoids and teratomas. Rainey<sup>76</sup> reports a case of twisted ovarian dermoid in a child of two and a half years of age. Francesco<sup>29</sup> studied the changes of blood vessels of tumors of the ovary and invariably found changes in the media and intima.

In a series of 296 abdominal operations, Sampson<sup>70</sup> reports 64 cases of endometrial implantations and emphasizes that similar implantation may occur with malignant endometrial tissue.

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# Selected Abstracts

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## Diseases of the Urinary Tract

**Blum, Eisler and Hryntschak: Cystoradioscopy.** Wiener Klinische Wochenschrift, 1920, xxxiii, 677.

The authors describe the filling and emptying of the urinary bladder observed by means of the fluoroscope, using a 5 to 10 per cent potassium iodide solution in the bladder. They believe the method is valuable for the diagnosis of diverticula and trabecula. The danger of doing harm by using the x-rays can be avoided by suitable filtration and short exposures. They designate the filling as diastole and the emptying as systole of the bladder.

Ten to thirty c.c. of the solution in the normal bladder, (patient standing) gives a saucer-shaped shadow in the anteroposterior view. As more is introduced, by means of a catheter and syringe, up to 200 c.c., the upper edge of the shadow rises and the ends thicken until the shadow is almost rectangular with rounded corners. Seen from the side with 10 to 30 c.c. in the bladder, the shadow resembles a cone with the smaller end up. As more is introduced up to 200 c.c. the shadow becomes ovoid with the smaller end up.

Now if with 200 c.c. in the bladder the detrusor muscles contract, the rectangular shadow seen in the anteroposterior view becomes circular and, as the fluid runs out, the shadow becomes concentrically smaller and smaller until the last drop is out. The shadow seen from the side during this process first becomes oval and then gradually decreases in size keeping the same shape.

If the fluid is allowed to run out through the catheter, and the detrusor muscle is not brought into action, the shadow is simply the reverse of that in the filling process, it does not become circular in the anteroposterior or oval in the side views.

When the bladder feels full to the patient, peristaltic waves can be seen in the shadow, more easily in the side view.

The authors intend to carry on further experiments in pathologic bladders concerning the problems of residual urine, valve action of the ureteral openings, and diverticula of the bladder.

FRANK A. PEMBERTON.

**Stevens: Urology in Women.** Journal American Medical Association, 1923, lxxxi, 1917.

In a study of 200 nonpregnant women with urinary disturbance, Stevens found the symptoms were due to urinary tract conditions in 75 per cent, while lesions of the generative organs, although present in a large proportion of cases, were possible etiologic factors in only 27 per cent. In a series of 169 cases, he found urethral strictures in 55.4 per cent, whereas in thirty-seven calibrations ureteral strictures were found in 29.7 per cent. The author states that relief of symptoms is due more to dilatation of urethra than to dilatation of ureter. In a study of 3,642 cases, pyelitis was discovered in a little less than one per cent. However the author believes these figures in general are too low.

In his conclusions the author states that the most important etiologic factor in pyelitis of pregnancy is pressure on the ureters by the enlarged uterus. Drainage and lavage of the renal pelvis through ureteral catheters is the treatment of choice in pyelitis of pregnancy. In unilateral renal tuberculosis occurring during pregnancy, the affected kidney should be removed as soon as the diagnosis is made.

WM. KERWIN.

**Mills, Ralph G.:** A Preliminary Study of Postoperative Catheterization. *Chinese Medical Journal*, 1921, xxxv, 217.

Mills draws the following conclusions: Urinary retention appears to be the most frequent in operations involving the pelvic structures, especially the rectum and peritoneal surfaces, and to decrease in frequency as that region is departed from. Urinary retention is favored by shock and consequent low blood pressure with decreased output of concentrated urine, by pain, nausea, and vomiting, plugs, packing and other mechanical factors causing perineal pressure, and by the presence of a neurotic temperament, having some relation to race and sexual activity. Such difficulty before puberty was rare. Urination after operation can be facilitated in most cases by crowding fluids during the twenty-four hours before operation, by the relief of postoperative nausea, pain and distention, and by various local methods and psychical influences.

In most cases urination will occur when sufficient fluid has accumulated in the bladder even though the amount may exceed somewhat the usual content of the viscus. Danger of rupture in the absence of pain is negligible within the first twenty-four hours, and the use of palpation and percussion will prevent this accident in any case. The establishment of a time limit within which a patient must void or be catheterized is a mistake and likely to do more harm than good. Catheterization is not altogether a harmless procedure and when repeated may lead to cystitis in weakened patients and those with residual urine.

Physicians and nurses should consider that the function of the catheter in postoperative conscious patients within the first twenty-four hours is limited to the relief of pain due to an accumulation of any amount of urine in the bladder and is not for the mechanical withdrawal of the fluid to prevent a possible overdistention or rupture of the organ.

F. J. SOUBA.

**Curtis, A. H.:** Management of the Female Bladder After Operation and During Pregnancy: A Further Study of Residual Urine in Its Bearing on Urinary Tract Disturbances. *Journal American Medical Association*, 1923, lxxx, 1126.

The normal bladder is highly resistant to virulent bacteria and it is only when repeated catheterization is done after operations and during the course of pregnancy that this rule has exceptions. Residual urine is given as the cause in these exceptions. Since 1915 the following method of management of the bladder has been carried out by Curtis: Catheterization is avoided if possible; if the catheter has been employed it is thereafter used once daily until the patient has regained the power of complete evacuation. No patient is allowed to suffer from distention. One eighth per cent of silver nitrate is instilled after each catheterization. The urine is kept acid and hexamethylenamin is administered. Residual urine was found in sixty-four per cent of all the cases that were repeatedly catheterized. The most important part of the treatment is daily catheterization following micturition in the patients, in whom residual urine is found. He does not consider a retention of an ounce as indicating residual urine unless pus cells are found.

W. KERWIN.

**Vogt:** Urotropin Intravenously for Inability to Urinate Following Operation or Delivery. *Muenchener medizinische Wochenschrift*, 1924, xxiii, 737.

The writer discusses the various methods used locally and generally in the attempt to make patients void after a delivery or an operation, and especially the use of pituitary extract intravenously or intramuscularly. Using a catheter not only subjects the patient to a great deal of discomfort but also to infection with a possible troublesome cystitis, and a catheter once used means repeated catheteriza-

tions. The best results are obtained by the slow injection of 4 to 6 c.c. of a 40 per cent solution of urotropin given intravenously and repeated at two or four hour intervals until the patient voids. The urotropin seems to be not only efficient to influence the sympathetic control of the bladder muscles but also apparently has a specific action on the sphincter muscle itself. The author does not think that there is any nephritic or vesical condition which in any way would contraindicate the suggested medication.

A. C. WILLIAMSON.

**Haworth, J. K.: Retention of Urine Due to Haematocolpos and Haematometra in a Child.** *British Medical Journal*, May 7, 1921, p. 673.

The author gives a short report of a girl, eleven years old, with a markedly distended bladder. There was an imperforate hymen with a pronounced retention of menstrual secretion which produced a urinary retention. Incision of the hymen was followed by complete recovery.

F. L. ADAIR.

**Young: Urinary Incontinence in the Female.** *Journal American Medical Association*; 1922, lxxix, 1753.

The author brings out the futility of methods used up to within the past few years. He ascribes the failure to arrive at a proper method of procedure to the anatomic ignorance of the operator. Young points out the necessity of carefully suturing the fascia and muscle forming the external sphincter of the bladder, and in a second group of cases the plication of the vesical sphincter itself, as the first step of the operation. He has met with no failures in eighteen cases. He divides these cases into two classes: (1) occurring in young women soon after childbirth; (2) in elderly women where the cause is a gradual stretching and giving away of the musculature at the neck of the bladder. He thinks the second class is preventable if proper instructions are given following childbirth. The symptomatology, diagnosis and anatomy, and the operative technic are detailed in full.

WM. KERWIN.

**Bonney: Diurnal Incontinence in Women.** *The Journal of Obstetrics and Gynecology of the British Empire*, 1923, xxx, 358.

Diurnal incontinence is common in parous women over forty. At first it is noticed only on coughing, sneezing, laughing, walking etc. Examination usually fails to reveal a pronounced cystocele but on straining down, the bladder and urethra will be found to wheel around the pubic angle until the meatus points upward and forward instead of downward and forward. At the height of the expulsive effort a jet of urine escapes. In these cases one is dealing with a relaxation of the anterior portion of the pubocervical muscle sheet, inaccurately called the pubocervical fascia. Normal urinary control depends more on the character of the meatus and the tone of the cervical muscle sheet supporting the fixed portion of the urethra than upon the so-called vesical sphincter. Any increase of intraabdominal pressure is accompanied by a contraction of the pubocervical muscle increasing the valve-like action of the urethra and preventing escape. Relaxation of the anterior or fixed portion of the urethra causes the urethra to roll under the pubis and sphincter control is lost. Incontinence does not accompany relaxation of the mid third of the pubocervical muscle (cystocele) or of the posterior third (prolapse of the vaginal wall). On the contrary urination in these cases may be difficult.

Success in operative treatment for incontinence of this type depends not upon constricting the urethra or the vesical neck, but upon strengthening and tightening the anterior end of the pubocervical muscle sheet. This is accomplished by

incising the anterior vaginal wall from a point above the urethrovesical junction almost to the meatus. The floor of the urethra is exposed and a series of sutures are inserted "Lembert wise" so as to overfold the tissue. H. W. SIUTTER.

**Gayet: Bladder Fistula as a Result of Tuberculous Salpingitis.** *Archives Franco-Belges de Chirurgie*, 1923, vii, 644.

After a careful review of the literature the author was able to find but a few case reports of this complication. In this paper he reports two such cases of his own.

Occasionally these fistulas may form by a direct adherence of the tubercular tube to the bladder with a secondary breaking down of the intervening walls. More commonly, however, there is a tuberculous abscess formed between the affected tube and the bladder. When such a fistula does occur, the usual sign and symptoms of tuberculous cystitis become manifest. The bladder contains a thick caseous pus. Cystoscopy will occasionally show an ulcerated area at the center of which may be found a small fistular tract from which pus issues. On the other hand this fistular tract may be so small that it cannot be found. It most often takes the form of a fissure between the folds of the bladder mucosa rather than a definite opening. Pressure on the abdomen or in the vagina will occasionally aid materially in its location by forcing more pus through the opening.

The bladder urine uniformly shows the presence of the Koch bacillus either by staining and microscopic examination or by the inoculation test. The condition may be differentiated from renal tuberculosis since ureteral urine in fistula cases fails to show tubercle bacilli.

Gayet does not feel that the spontaneous rupture into the bladder of a tuberculous tube is necessarily a curative process as is often the case with rupture of a pyogenic tube but on the contrary, these patients if let alone usually fail gradually.

Another aid in the diagnosis is the use of x-ray after introduction of some opaque solution, such as 10 per cent collargol, into the bladder.

The treatment consists in a radical removal of the pelvic focus of infection. After that the bladder takes care of itself and the urinary symptoms disappear. So far as the fistula itself is concerned, it should be extirpated and the bladder edges closed if it can be easily found. If, on the other hand it is so small that it can be located only with great difficulty it should be let alone.

THEODORE W. ADAMS.

**Pennisi: Uretero-cystostomy for Uretero-vaginal Fistula.** *Policlinico, sez. chir.*, 1920, xxvii, 362.

Ureterocystostomy first performed by Novaro now has large clinical sanction, but cases are not numerous in which a definitive success has been under adequate observation for a long period.

The author's patient after a criminal abortion, had a grave uterine infection, phlegmon of broad ligaments, pelviperitonitis, general septicemia. Colpotomy was done for fluctuating tumefaction in left vaginal fornix, followed by leakage of urine.

About twenty days after colpotomy the diagnosis of ureterovaginal fistula was made.

Operation about 70 days after colpotomy: Median laparotomy, adhesions between large omentum and left margin of uterus separated and some of them removed, left broad ligament shortened, and cicatricial ureter dissected out in its lower third; removal of left adnexa and of proximal ureteral stump imbedded in cicatricial tissue near bladder. Distal stump freshened and sutured into opening in bladder wall toward fundus, to left and a little posterior, with fine catgut; field of operation completely extraperitonealized; abdomen closed in three layers; no catheter in ureter nor in bladder.

Patient syringed every four hours, kept under opiate four days. On fifth day the patient urinated spontaneously.

She was discharged forty-two days after operation. Five years after operation, normal function of ureter and bladder, general good health.

P. GRAFFAGNINO.

**Brodhead, George L.: Spontaneous Closure of Large Vesico-Uterine Fistula.** Medical Record, 1920, xeviii, 437.

Brodhead reports the case of a sextipara, thirty-seven years of age, who had a normal parturition after a six hour labor. She passed urine normally for three days after the birth of her child. On the sixth day she came under Brodhead's care. She was then mildly septic and incontinent. Vaginal examination revealed an opening the size of the finger leading from the region of the internal os to the bladder from which urine freely escaped. The fistula was open for about three days, then closed and remained closed.

C. O. MALAND.

**Dyke and Maybury: On the Attempted Production of an "Ascending" Renal Infection in Rabbits.** The British Journal of Surgery, 1924, xii, 106.

These authors made a series of experiments on rabbits in an effort to bring about an ascending infection from the bladder. Emulsions of cocci were injected into the bladder and, in other cases, sponges soaked in bacterial cultures were introduced into the bladder and allowed to remain. In none of these cases was any evidence of infection found in the kidney. In another series carmine and India ink were introduced in suspensions into the bladder and the urethra ligated. In no case were particles of pigment demonstrable above the bladder. By infecting the ureters it was found possible to obtain an infection of the kidneys. The authors feel, however, that this was due to a direct extension of the infection along the epithelium, rather than to a regurgitation of the renal pelvic contents into the renal tubules.

R. E. WOBUS.

**Baker: An Analytical Study of Fifty Cases of Ureteral Stricture and Pyelitis.** Annals of Surgery, 1921, lxxiii, 348.

In this series of cases comprising females, aged from thirteen to sixty, the disease had existed from one to twenty-five years. Basing his assumption on the work of Rosenow, and Bumpus and Meisser, that kidney infection is often blood-borne, Baker incriminates the tonsils in 42 per cent, the teeth in 22 per cent, both in 14 per cent, and the antrum in 4 per cent. In 18 per cent no focus of infection was demonstrable. In all but one case, ureteral stricture was demonstrable. The diagnosis was largely based on the history, pus being present in only 60 per cent at time of examination.

Baker concludes that hematogenous infection, coupled with a strictured ureter, is the most frequent cause of pyelitis.

R. E. WOBUS.

**Schwarz: The Therapy of Pyelitis.** Therapeutische Halbmonatshefte, 1920, xxxiv, 693.

Almost all authorities are agreed that the acute attack of pyelitis subsides under expectant treatment and only in a minority of cases does the condition pass over into a subacute or chronic one. The frequently long continued fever, however, has a markedly detrimental effect upon the patient. On the other hand, a single ureteral catheterization combined, if necessary, with drainage of the kidney pelvis for a short time may cause an abrupt fall in temperature and relief of the attack.

More important is the fact that cases under medical treatment may be clinically cured yet carry pus and pathogenic organisms in their urine for years. Such patients are subject to the possibility of an acute flare-up at any time. Some authorities feel that most of the pyelitis of adult life represents only an exacerbation of an uncured pyelitis dating from childhood. Whereas, of 80 cases treated medically, Lenhartz found only 16 bacteriologically cured and 20 improved; Helweg, in 17 cases treated by pelvic lavage, had 15 permanent cures, and Hartmann 16 cases with 13 cures.

Other methods of treatment recently recommended are extreme concentration of the urine by limitation of fluids in conjunction with acid sodium phosphate and the urinary antiseptics, as urotropin or salol. The urine in ten cases of acute, subacute and chronic pyelitis treated in this way by Haas was rendered permanently sterile in four days. Autovaccines as well as the intravenous injection of urotropin have given only temporary results. Nonspecific protein therapy has not yet been sufficiently tried out. Salvarsan has given brilliant results in the limited group of cases due to cocci, especially gonococci, sterilizing the urine permanently by one or at most two injections, yet it is of no value in the coli infections which comprise 70 to 90 per cent of all cases.

Chronic cases should all be subjected to instrumental examination to determine the exact source of the pyuria and the extent of associated kidney damage.

All cases should be diagnosed as early as possible and treatment continued until they are permanently free from pus and bacteria.

MARGARET SCHULZE.

Robinson, A. Leyland: A Note on Injuries to the Female Ureter. *British Medical Journal*, May 7, 1921, p. 665.

The author calls attention to the frequency of injury to the ureter in pelvic surgery. He brings out the points which are useful in the recognition of the ureter during operation. He mentions the results which may follow from bilateral and unilateral injury. He mentions the ideal treatment as being immediate repair or implantation, but emphasizes the point that it may not be feasible in all cases and that it does not give uniformly good results.

F. L. ADAIR.

Gouverneur: Suture of the Ureter. *Gynécologie et Obstétrique*, 1920, ii, 231.

After section of a ureter, the best method of repair is transplantation of the proximal end into the bladder. If the distance to the bladder is too great to allow of this procedure, the cut ends of the ureter must be anastomosed. There are two methods of anastomosis: The end-to-end method similar to vascular sutures, and the method of invagination such as that of Ogge. Of the two, the author prefers the direct end-to-end anastomosis. Upon the perfection of the suture depends the final result. It is superior to the invagination method in that it is simple and rapid, does not require the dilatation of the distal cut end, nor leave such a wide band of constriction after healing.

After end-to-end anastomosis there is always a ureteral dilatation proximal to the suture which next involves the pelvis of the kidney and ends finally in renal atrophy. This explains why the end-results of ureteral anastomosis are not good from a functional standpoint. However, the operation must be conserved because a deficiency is better than a total suppression following nephrectomy or ligation of the ureter.

R. T. LAYAKE.

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## Original Communications

### THE COINCIDENCE AND INTERFERENCE OF UTERINE TUMORS\*

BY PROF. DR. OSKAR FRANKL, VIENNA  
(From the First "Universitäts Frauenklinik")

THE frequent coincidence of different tumors in the same uterus induced me to investigate carefully the material of the First Gynecological Clinic of Vienna between May 1, 1908, and December 31, 1923. In presenting the results of these extensive investigations, I wish to divide the cases into three groups: (1) myoma and sarcoma; (2) myoma and carcinoma; (3) carcinoma and sarcoma.

#### I. MYOMA AND SARCOMA

It seemed to me of particular significance to observe how frequently sarcomata developed within myomata, and whether there is a difference between such sarcomata and these unassociated with myomata.

First of all I wish to present the entire material examined in Table Ia, belonging to this group.

TABLE Ia  
MAY 1, 1908 TO DECEMBER 31, 1923.

Cases of uterine myoma	1878
“ “ “ sarcoma	38
“ “ “ “ and carcinoma	8

It is my hope that this abundant material will furnish statistical data for comparison with that of other investigators. The cases of myoma alone are summarized in Table IIa.

\*Read by invitation at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."



TABLE IIa  
1878 CASES OF UTERINE MYOMA

Body		1844
Cervix	1.38%	34
Pedunculated myoma of the fundus (of these with twisted pedicle 7)		8
Intramural myoma		2
Myoma and pregnancy		49
Myoma and adenomyosis		7
Hematometria, hematosalpinx		4
Myoma and tuberculosis uteri		4
Myoma and malformations of the uterus		6

Among 1878 cases of myomata I found forty-six sarcomata, about the same proportion as in my textbook published ten years ago, where I recorded 514 myomata with twelve sarcomata. In Table IIIa, are given in addition statistics of other observers. I may remark that the high percentage of Warnekres is of no general value.

TABLE IIIa

	Per cent
Frankl, 1878 Myomata, 46 sarcomata	2.4
Frankl, 514 Myomata, 12 sarcomata	2.3
Warnekres	10
Schottlaender	3.3
Döderlein	3.0
Hofmeier	2.0
Eckler	2.0
Miller	2.0
Leith	2.0
Evans	1.8
Olshausen	1.2
Berreitter	0.4-0.5

My observations, as well as those reported in the literature, indicate that sarcoma of the uterus should be considered a rare form of tumor.

If we ask what is the relationship of uterine myomata and sarcomata to each other, several answers are possible: (a) the same uterus may contain a myoma and a sarcoma entirely independent of each other; (b) a myoma may be destroyed by a sarcoma which developed outside of it; (c) most frequently, however, the sarcoma develops within the myoma, growing from the center to the periphery, so that the myoma becomes destroyed and is replaced by the sarcoma. The latter group of cases should be described in detail.

The most important point in this problem is the histogenetic development of the sarcoma cells. Does the sarcoma cell develop by so-called metaplasia from the cellular element of the preexisting myoma? Many years of histologic study and experiments on animals lead me to the following conceptions of the tumor problem in general and of the development of sarcomata within myomata in particular. I am giving due consideration to the extensive literature on the subject, but must necessarily set it aside for the present.

Only such cells of the organism are fully mature which are completely differentiated histologically and which functionate physiologically. Therefore the elements of a benign tumor cannot be considered to be fully mature. Though matured histologically, they are physiologically inferior. Only such cells are fully mature which are found within an organ, their nutrition, growth and function having adapted themselves exactly to their surroundings and having adjusted themselves to the general economy of the organism. I have never seen transitions of fully matured cells into neoplastic elements as would permit me to conclude that normal cells develop into tumor cells by metaplasia. While agreeing with Strong, I venture to assume that a fully matured element can never develop into a benign tumor cell. It is contrary to our conceptions of development to believe that elements of an inferior kind can develop from such of the highest type. Observations on regeneration following surgical lesions as well as animal experiments lead us to believe that among fully matured tissue cells there are unused cells, not fully differentiated, which have the ability to produce new elements. These are properly located orthotropic cells. Of course it is easier to find improperly located, that is, heterotropic, indifferent cells and cell groups. R. Meyer collected a large number of such findings and I can add a recent instance of a small island of stratified epithelium with not fully matured elements within the broad ligament of a newborn child. Orthotropic immature, poorly differentiated cells in groups, can easily be recognized. When speaking of carcinoma and sarcoma in the third part of this paper, I shall refer to such findings and the ability of these cells to produce tumors. At any time such cells may either degenerate or produce normal elements which would fully mature and keep their equilibrium within the tissue. When these indifferent cells are irritated by some (hitherto unknown) stimulant, a tumor may develop from this source. Whether this irritation is produced by pathologic, biochemical qualities of the fluids of the body or by bacterial toxins, is absolutely unknown at present. We know that the entire organism is affected in cases of malignant tumors, but not in cases of benign tumors.

Proliferation of poorly differentiated cells may result in their maturity histologically. A benign tumor will develop if the elements show such an intensive increase that they lose the equilibrium with their neighboring tissues. But when the increase of the cells takes place without any histologic maturation, the product will be a malignant tumor. This happens under the influence of a general involvement of the organism. The indifferent building material of the tumor reacts to the local stimulation with increase of cells, which do not mature.

The question naturally arises whether a proof exists for the assertion that embryonic cells are able to produce true tumors, particularly malignant growths. Attempts have been made to prove this by serologic experiments but have not led to any definite results so far. Many careful observers tried to decide this question by animal experiments, but the injection of embryonic cells has never produced true tumors. I personally experimented with emulsion of cells of fetal mice which I injected subcutaneously into the back of adult mice. Structures resembling myxomata resulted but I do not claim that these were true tumors. The presence of embryonic cells is not sufficient in itself to produce a tumor.

However we have proof that embryonic cells are capable of producing tumors, a proof, which nature offers us herself. Chorionepithelioma is a very malignant growth, which consists entirely of embryonic cells without any connective tissue or blood vessels.

From this point of view, the coincidence and interference of myoma and sarcoma in the uterus, appear in a different light than the adherents of the teaching of "metaplasia" believed. If a myoma develops from indifferent elements in consequence of stimulation, then it happens in the following manner: The indifferent cells proliferate but at the same time they undergo an extensive histologic differentiation, they do not mature physiologically and their equilibrium with their surroundings is lost. It may happen that on account of a pathologic quality of the body fluids, the proliferating cells will suddenly cease to become histologically mature and remain in a more or less low grade of maturation. These cells destroy the neighboring tissues and if such a sarcoma develops in the center of a myoma, its elements devour the histologically, fully mature cells of the myoma and occupy their place. Therefore, I do not speak here of "malignant degeneration," because we reserve the word "degeneration" for benign retrograde metamorphosis. Here we have to deal with "sarcomatous destruction."

Sometimes the elements of a sarcoma show such high degree of histologic maturation, that it might be very difficult and at times impossible to recognize the sarcomatous qualities of the cells. My experience shows that it is possible to find typical elements which render the diagnosis easier, if one examines numerous sections from various parts. I would advise that such tumors be designated "sarcoma of high maturity," as I designated similarly some years ago the so-called "adenoma malignum" as a "glandular carcinoma of high maturity."

Sarcomatous tumors of the uterus which contain cartilage, striated muscle fibers, osteoid tissue, were found three times in our material. In such cases one cannot exclude a preexisting myoma, but in the majority of cases there was no preexisting fibroid.

The decision whether in a case of sarcoma there formerly existed a

myoma is not always easy to make. Occasionally a myoma cannot be excluded because it might have been destroyed by a sarcoma. But not rarely the preexisting myoma is still clearly recognizable. Therefore the positive finding is of higher value than the negative. For the recognition of a preexisting myoma I place special stress on the completely or partially preserved myoma capsule, on the arc-like sharp borderline of the former myoma, which the edge of the sarcoma follows.

Table IVa, contains the results of the examinations of my entire sarcoma material based on these signs.

TABLE IVa  
38 CASES OF UTERINE SARCOMA

PREEXISTING MYOMA	PROBABLY PREEXISTING MYOMA	MYOMA NOT PREEX.	UNDETERMIN.
17	5	15	1

It is of interest to investigate whether there exist clinical differences between sarcomata with and those without any preexisting myoma.

Table Va, shows the data of the ages of our patients.

TABLE Va

	TOTAL	MS	S	U
50 years or more	21	9	12	
40-49	16	13	6 of these beyond 59)	
40 or less	1		3	1

It is evident that the cases of sarcoma which develop independently of a myoma within the myometrium or the mucous membrane, generally occur later than those with a preexisting myoma. This is explained by the fact that myomata in general originate at earlier ages. Sarcomata in the young are very rare. Our material does not contain any cases in children.

Regarding the number of previous pregnancies the following conditions may be of interest.

TABLE VIa  
PREGNANCIES OF SARCOMA BEARER

9 Nulliparae			
	3-4 pregnancies		9
	5-9 "		12
26 Multiparae	10 "		2
	11 "		1
	12 "		2
AVERAGE NUMBER OF PREGNANCIES OF SARCOMA BEARER			
MS		S	
3.45		6.06	

Patients in whom myomata surely or probably preceded the sarcomata averaged 3.45 pregnancies. Patients in whom there was no definite evidence of a preexisting myoma averaged 6.06 pregnancies. This agrees with the fact that the presence of myoma diminishes to a certain degree the number of pregnancies, while sarcoma without any preexisting myoma does not influence the condition. Our material shows that such sarcomata (S) occur more frequently in multiparae.

The shape and location of uterine sarcomata are exceedingly varied. Sarcomata which develop within myomata (MS) appear in the majority of cases in interstitial fibroids and grow in a centrifugal or centripetal direction. The mucosa may be penetrated, the broad ligament expanded and perforated, and not infrequently involves the peritoneum. The sarcomata which develop without any preexisting myoma are, in the overwhelming majority of cases, tumors which project into the cavity of the uterus as nodules, villi or "grapes." They do not penetrate as a rule very deeply into the myometrium and their borderline runs parallel to the perimetrium. The microscopic diagnosis of these tumors is nearly always possible. In sarcomata with preexisting myoma (MS) the microscopic diagnosis is possible only when the tumor has penetrated the mucous membrane. These points are illustrated in Table VIIa.

TABLE VIIa  
MATERIAL FOR MICROSCOPIC EXAMINATION

		POSSIBLE TO GET	IMPOSSIBLE TO GET
MS	22 cases	7	15
S	15 cases	14	1

On account of the exceeding difficulty to clinically diagnose uterine sarcoma, I considered it necessary to go into detail discussing this question.

For the same reason a few words about bleeding may be added. Pathologic bleedings play a very important rôle in both groups of sarcomata. In the group S among fifteen cases there was only one without bleeding. Among the tumors of the other group (MS) there were six cases without any irregular, and two cases with insignificant bleeding. (See Table VIIIa).

TABLE VIIIa  
HEMORRHAGE

MS	22 cases	14 times
S	15 cases	14 times

The prognosis of uterine sarcoma is bad. Only early diagnosis may prevent recurrences which are usually due to invasion of tumor cells into blood vessels. The diagnosis of sarcoma presents great difficulties.

The symptomatology does not offer any positive differentiation from myoma. It is frequently impossible to obtain any material for histologic examinations. Perhaps some day serology will offer diagnostic means which clinical and microscopic methods do not give us so far.

## II. MYOMA AND CARCINOMA

The relations between myoma and carcinoma occurring in the uterus simultaneously or succeeding one another, must be studied from three points of view: (1) Simultaneous occurrence of carcinoma and myoma in the same uterus but independent of each other; (2) Simultaneous occurrence of myoma and carcinoma with local interrelationship, growing within one another; (3) Occurrence of a cancer in the stump of a uterus, which was amputated supravaginally for a myoma. Table Ib will illustrate the examined material.

TABLE Ib  
1878 CASES OF MYOMA, 1036 CASES OF CARCINOMA

Cervix	919
Body	117 (11.2%)

The accompanying tables (IIb, and IIIb) show the associated conditions and lesions.

TABLE IIb  
CHARACTERISTIC OF 919 CASES OF CARCINOMA OF THE CERVIX

Lipoma in the myometrium	1
Metastasis in the endometrium	1
Metastasis in the myometrium	1
Carcinoma of the stomach	1
Tuberculosis of the endometrium	1
Carcinoma of the ovary	3
Malformation of the uterus	2
Pregnancy	15
Hematometra, hematosalpinx	2
After supravaginal amputation, total	8

TABLE IIIb  
CHARACTERISTIC OF 117 CASES OF CARCINOMA OF THE UTERINE BODY

Carcinoma of the ovary	11
Tuberculosis of the perimetrium.	1
Carcinoma of the tube	3
Carcinoma of the breast	1

We note therefore 1878 cases of myoma and for the same period 1036 cases of carcinoma, 919 of the cervix and 117 of the body. In 72 cases, myoma and carcinoma were found in the same uterus. Among 919 cases of cervix cancer, 62 uteri also contained myomata. Among 117 cases of body cancer, 10 uteri also contained myomata.

These figures stand in such strong contrast with the data of other investigators that I must refer to the literature here more closely. I

TABLE IVb

CASES OF CARCINOMA	COMBINED WITH MYOMA
919 of the Cervix	62
117 of the Body	10
Winter: Myoma and carcinoma of the body is $2\frac{1}{2}$ times more frequent than myoma and cancer of the cervix.	
Krüger: Myoma with Cancer of the Body: Myoma with Cancer of the cervix = 10:4.2.	
Marchesi: Myoma with Cancer of the Body: Myoma with cancer of the cervix = 10:4.5.	
Piquand: Carcinoma of the uterine body is 5-10 times more frequent in the myomatous uterus than in the nonmyomatous uterus.	

hereby set aside the reports of minor significance and present only the most important conclusions in Table IVb.

Most of the authors started their examinations from their myoma material; only a few started with the carcinomatous uteri. The latter method prevents mistakes to a greater degree. When the investigator is basing his studies upon uteri removed for myoma then he always works with larger myomata, because small fibroids many times do not provoke any trouble and are not treated surgically. However, it is not well to pay attention only to the relations of large myomata to coincident carcinomata. On the other hand, I also think it insufficient to start only from the carcinoma material, and I consider only results reliable which include the entire material of myomata and carcinomata. Not only the large, but also the small coincident myomata must receive full consideration. For it is wrong to believe that carcinomata occur more often with large myomata than with small fibroids.

Basing my findings on myomata, we see that in 3.8 per cent of all myomata, carcinoma occurs at the same time. The number of body cancers, as related to the entire myoma material is 0.5 per cent. The number of cases of cervix cancer in relation to the entire myoma material is 3.3 per cent.

Starting with carcinoma I find that in 6.8 per cent of operated uterine carcinomata, myoma was also present. (See Table Vb.)

TABLE Vb

6.8% of all cases of carcinoma of the uterus combined with myoma.
3.8% of all cases of myoma are combined with carcinoma.
0.5% of the latter are carcinoma of the body (10 cases).
3.3% of the latter are carcinoma of the cervix (62 cases).

These figures afford an entirely different picture from those given by other authors, whose data are based on insufficient material, or are based on myoma examinations and, therefore, are not reliable. Their findings made it necessary to construct special theories to explain the pretended frequent occurrence of carcinoma of the uterine body in

cases of myomata and the frequent occurrence of carcinoma in the myomatous uterus in general. But if we find that 6.8 per cent of all operated uterine cancers show myomata at the same time, it is certainly no more frequent than myomata in the noncarcinomatous uterus. On the other hand the frequency of 3.8 per cent of all myomatous uteri being carcinomatous at the same time, is relatively high compared with the general frequency of uterine cancer. We cannot overlook the relatively frequent coincidence of myoma and carcinoma in the same uterus. A careful examination of my entire material, examined from both sides, leads me to the conclusion that carcinoma of the body is no more frequent in the myomatous uterus than that of the cervix.

Older authors believed that myoma induces an endometritis or hyperplasia of the mucosa, which may forward the development of cancer. I personally could show twelve years ago that, in cases of myoma the mucous membrane may become hyperemic, edematous, or atrophic, but neither hyperplastic nor inflamed. Therefore we cannot speak of such an etiology. I do not think that we have any reason to believe that myoma is a factor in furthering the development of cancer. But in accordance with Meyer, we can assume "a particularly predisposed ground" for both tumors. Such uteri have a special tendency for development of tumors. The resistance of the tissues against unlimited proliferation of cell groups is diminished and there exists indifferent cell material for the production of both myomatous and carcinomatous tumors.

The foregoing data make it necessary to consider at least some clinical factors, namely, age of the patients and number of the deliveries.

Most of the women with myoma who come under observation are between forty and fifty. The next preferred decade is between thirty and forty years. Then follows the decade between fifty and sixty. Table VIb shows the ages of patients with myoma, cancer of the cervix, cancer of the body and also the ages of these women who are affected with myoma and carcinoma simultaneously.

TABLE VIb

Preferred age for myoma	40-45 years
Preferred age for cervix cancer	40-50 years
Preferred age for body cancer	50-60 years

62 CASES OF MYOMA AND CARCINOMA OF THE CERVIX UTERI				
LESS THAN 31	31-40	41-50	51-60	BEYOND 60
2	10	25	18	7

10 CASES OF MYOMA AND CARCINOMA OF THE BODY		
41-50	51-60	BEYOND 60
4	5	1



It is evident that women who are affected with myoma and carcinoma simultaneously show the same preferred age as those affected with cancer of the cervix or of the body without any myoma.

Table VIIb gives information relative to the number of deliveries in cases of myoma, carcinoma of the body, carcinoma of the cervix, also of cases of myoma and carcinoma simultaneously.

TABLE VIIb  
NULLIPARAE IN CASES OF

MYOMA		CERVIX CANCER		BODY CANCER	
Frankl	25.8%	Koblanck	4.6%	Hofmeier	25%
Gusseow	27 %	Hofmeier	4.8%	Weibel	24%
O'shansen	30 %	Eden-Lockyer	4 %		
Schroeder	33 %	Theillhaber	2.9%		
Chrobak	36 %				

NULLIPARAE OF CASES OF

MYOMA AND CERVIX CANCER	MYOMA AND BODY CANCER
6.4%	40%

AVERAGE NUMBER OF PREGNANCIES IN CASES OF

MYOMA	CERVIX CANCER	MYOMA AND CERVIX CANCER
2.7	4.5-6.5	2.4

Of the sixty-two women who had myoma and cervical carcinoma only four were nulliparae, or 6.4 per cent. The average number of deliveries is 2.4. These data are not identical with the average number in cases of cervical cancer only, but do not vary greatly.

Of the ten women who had both a myoma and carcinoma of the uterine body, four were nulliparae. Though the material is small the findings agree with those obtained in cases of carcinoma of the uterine body without myoma.

In conclusion we may say that carcinoma is found more frequently in the myomatous uterus than in the nonmyomatous. Contrary to the statements of other authors I could not find greater frequency of body cancer as compared to cervical cancer in the myomatous uterus. The frequency corresponds about to the relative frequency between cancer of the body and cancer of the cervix in general.

Anatomic changes of the endometrium which could further the development of cancer are not demonstrable. The average age and the number of previous pregnancies of patients with myoma and carcinoma of the uterus at the same time do not differ markedly from the preferred age and fertility of those women who are affected with uterine cancer without any myoma. Greater predisposition of the uterus to tumor development makes us understand the relative frequency of both tumors in the same organ.

The two cases of local interference which I have observed may be described briefly.

Lab. Prot. Nr. 16489.—Patient, sixty-seven years old, had had six deliveries, and two abortions. Out of the external os there protruded a bleeding tumor, the size of a hen's egg. It was of hard consistency and nodular appearance. The uterine wall contained several myomata. The polyp was of myomatous structure. The portion which protruded into the vagina was transformed into a carcinomatous ulcer, which did not extend upward very far. (See Fig. 1.)

Lab. Prot. Nr. 5289.—Patient, forty-seven years old, no pregnancies. In the uterine wall there was a tumor of the size of a man's head, which was cystic. The cavity of this cyst contained a yellowish turbid fluid; at one point of the inner surface of the cyst were found two soft protuberances, one the size of a bean, the other that of a hazel nut. Microscopic examination showed that the tumor was a cystic adenomyoma. The protuberances consisted of a solid carcinoma of medium maturity. The case is only to be interpreted as an adenomyoma becoming cystically degenerated and developing cancer within its epithelial parts.

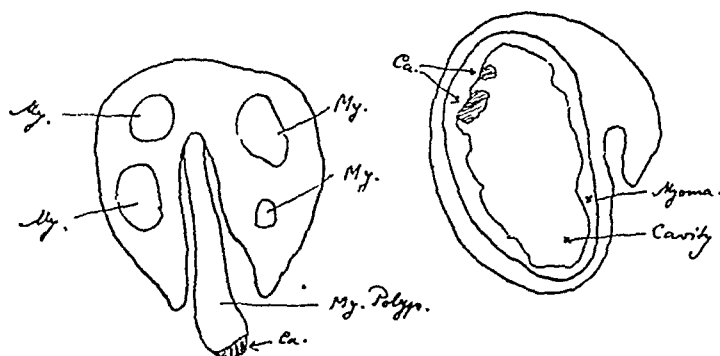


Fig. 1.

For the diagnosis of carcinoma in the cervical stump after a supravaginal amputation, it is essential to find out whether the cancer did not already exist at the time of the first operation. Table VIIIb includes the material observed during the period mentioned above.

TABLE VIIIb  
CARCINOMA IN THE STUMP AFTER SUPRAVAGINAL AMPUTATION

TOTAL	AMPUTATION MADE FOR UTERINE MYOMA
8	5
INTERVAL BETWEEN SUPRAVAGINAL AMPUTATION AND DEVELOPMENT OF CANCER IN THE STUMP	
5 Years	
6 Years	
8 Years	
11 Years	
7 month (Cancer beginning)	

Also in the last case I am inclined to believe that in spite of the short interval there was a real cancer of the stump, since there was a very early stage of development.

### III. CARCINOMA AND SARCOMA

I have observed eight cases of carcinoma and sarcoma in the uterus simultaneously. There are different possibilities for such an occur-

rence. Carcinoma and sarcoma may exist in the uterus without any mutual contact. During the growth of the tumors they first come in contact, later they grow into each other. It is quite possible that carcinoma and sarcoma take their origin at the same time in the same field, if indifferent material for the development of both tumors exists. But in the special case it will be most difficult to demonstrate such a process, unless the tumor would be at an extremely early stage of

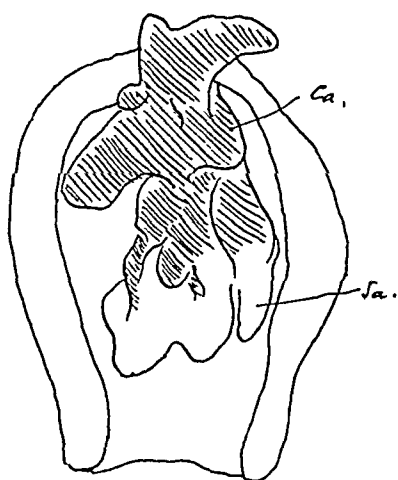


Fig. 2.

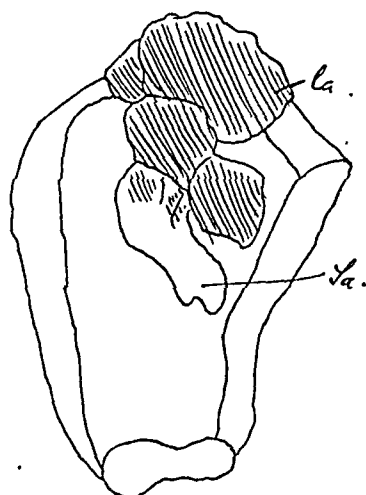


Fig. 3.

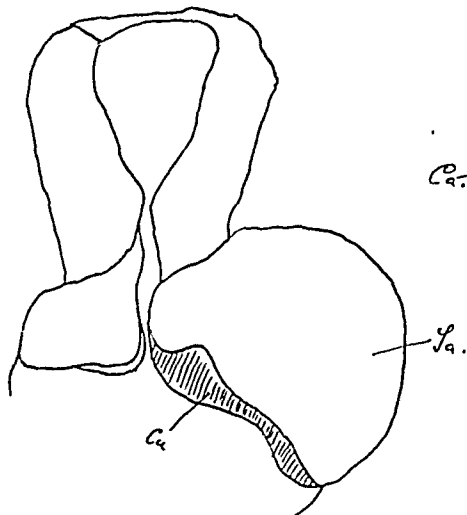


Fig. 4.

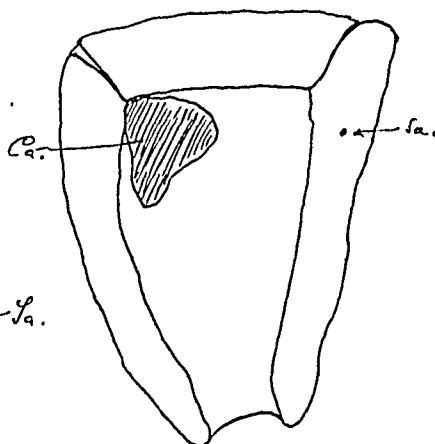


Fig. 5.

growth. For the majority of cases, however, we must assume that the tumors first existed side by side, and that later one grew through the other.

In no single case thus far, was it possible to prove that in accordance with the older opinion, the cancer would have provoked a "sarcomatous degeneration of the stroma" in the uterus.

The terminology of "carcinosarcoma" is correct for the cases of mutual intergrowth, but the term "carcinoma sarcomatodes" must

be reserved for such cancers which merely imitate the structures of sarcoma.

Among the eight cases which I have observed there were four extirpated uteri, while in the other four cases only curettage was done. Table Ic shows this material.

TABLE Ic  
TOTAL CASES

MYOMA	CARCINOMA	SARCOMA	SARCOMA AND CARCINOMA
1878	1036	38	8
Curettage	4	Extirpation	4
Carcinoma and sarcoma in the cervix			5
Carcinoma and sarcoma in the body			3
Interference	7	Independent	1

The sketches (Figs. 2, 3, 4, 5) show the conditions of the carcinomatous and sarcomatous components of these four uteri which were extirpated. In the first two cases there are polypoid tumors in the uterine cavity which show, that the carcinomatous portion evidently overwhelmed the sarcomatous. In the third case there developed a sarcoma from the cervical wall; its vaginal surface is covered by a superficial carcinoma.

The most interesting is the fourth case, a woman, aged forty-seven, who had been delivered once. Her uterus shows a sharply circumscribed carcinomatous polyp, which does not invade the myometrium very deeply. At some distance from this cancer there is found a single focus of merely microscopic size, which consists of stromatoid elements of lowest maturity, but showing already all characteristics of a beginning malignant growth. I think it is a very early sarcoma.

It was my endeavor to bring before you the important question of the coincidence and interference of uterine tumors which I have studied from an extensive material, which I personally examined during the last sixteen years. And if I have only given you some data for comparison for further investigations, the purpose of my work is fulfilled.

(For *discussion*, see p. 867.)

## CONGENITAL POLYCYSTIC KIDNEYS\*

By JAMES E. DAVIS, A.M., M.D., DETROIT, MICH.

THE literature upon this subject is somewhat difficult to review because of the rather loose employment of different descriptive terms by older writers. The following terms have all been used to designate a congenital, bilateral cystic degeneration in the kidneys:

1. "Congeries of renal cysts."
2. "Cystic degeneration of the kidney."
3. "Conglomerate cysts of the kidney."
4. "Cystic metamorphosis of the kidney."
5. "Polycystic disease of the kidney."
6. "Bilateral polycystic kidney."

Polycystic kidney is the most important congenital defect occurring in the renal organs and is characterized by the formation of numerous and diffusely distributed retention cysts which are usually visible in a naked eye examination. One organ may show only a potential change, while the other exhibits well advanced degeneration. The organ with only a potential change will rapidly develop a more extensive degeneration upon removal of the companion organ. This anomaly, like others of the renal organs, is associated with other developmental stigmata, such as harelip, cleft-palate, cardiac defects, meningocele, spina bifida, hypospadias, atresia or absence of the urinary bladder.

Polycystic kidneys are unmistakably congenital when they occur bilaterally in a fetus, newborn child or infant, providing the cysts involve the entire kidney tissues. A tentative diagnosis may be made when the condition is bilateral in adults who are usually past the age of forty and who may also have cysts elsewhere in other organs of the body, such as the liver, pancreas, spleen and omentum, and where there is accompanying hereditary or familial history which is of such a character as to justify true congenitality, and, if one kidney is removed, the other will invariably become multiply cystic.

*Occurrence.*—The occurrence of congenital cystic kidney is not confined to any specific age, for it may occur in the fetus, newborn child, infant, or even in old age, as late as ninety-eight years. It manifests an advanced unilateral appearance in the early age period of some cases. Its association with cysts elsewhere in the body occurs most frequently with those of the liver. This association has been found

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\*Read at the Thirty-seventh Annual Meeting of the American Association of Obstetricians, Gynecologists and Abdominal Surgeons, Cleveland, Ohio, September 18 to 20, 1924.

in 19 per cent of all cases. Associated cysts in the pancreas, omenta and spleen occur much less frequently. The evidence of its frequent hereditary character is very definite. In some instances a very striking familial history is present. The combined statistics of Barnett, Preitz and Garceau from 23,190 autopsies, revealed sixty-seven instances of bilateral congenital cystic kidneys or an average incidence in hospital records of 0.31 of 1 per cent or approximately one of every 350 patients autopsied in hospitals.

*Clinical Course.*—The life history of congenital cystic kidneys may be conveniently divided into three stages. The first is the latent which usually occurs at two periods—the completion of fetal life and between forty and sixty years. In each of these periods there has been a progressive enlargement of one or both kidneys, and usually without marked subjective symptoms. The recognition of the condition during this period is more often accidental than from the findings of physical examination, unless the patients are thin and the kidneys are bilaterally enlarged. The latent stage may last for a few months to many years or until the limited parenchymal tissue is unable to adequately meet the functional requirements. The second stage is characterized by subjective symptoms and objective signs, manifested by dragging-down pain and hematuria which may have a severity depending very directly upon the size, weight and distention of the tumor. This period may be prolonged from a few months to six, eight or more years. The third stage is particularly characterized by uremic symptoms. A decreasing elimination of urine, together with retention of nitrogenous waste products occurs and is prolonged through a few weeks or months.

*Symptomatology.*—The subjective symptoms from congenital cystic kidneys are mainly renal insufficiency, hematuria, pain and infection. The renal insufficiency may manifest itself by occasional headaches, spells of anorexia or occasional nausea, dizziness, general lassitude, inaptitude for work, loss of weight, in all, an essential symptomatic picture of chronic interstitial nephritis but with less cardiac involvement. In 40 per cent of the cases studied by Braasch at the Mayo Clinic there was hematuria. Sometimes this was the initial symptom even before a tumor mass could be palpated. It usually was profuse and persistent, lasting from a few days to weeks or months and during this time severe colicky pains occurred as the result of the passage of blood clots which undoubtedly followed the rupture of cysts. Intensification of the pain usually results from an increase in the size of the individual cysts or from their rupture, but as a rule, pain is not severe. Infection usually follows an increase in the size of the cysts and the resulting interference with drainage, giving characteristic evidence in pyuria, hyperexia, bladder irritability and

pain. The objective signs may be conveniently tabulated by the following observations:

1. Tumor mass in one or both kidney areas.
2. Increase of blood pressure.
3. Changes in the urine closely comparable with interstitial nephritis.
4. Cystoscopic characteristics.
5. History and differential evidence.

A unilateral or bilateral palpable tumor mass in the kidney areas is a strongly suggestive, though not absolutely and necessarily, a sign for positive diagnosis. The masses should appear nodular when palpated. The intervening abdominal wall, however, may obscure the nodular interpretation. The tumor mass or masses, contrary to most retroperitoneal tumors, will move up and down synchronously with respiratory excursions.

There is a variable degree of blood pressure increase in congenital cystic kidneys, depending upon the force necessary to propel the blood through the vessels having constricted lumina due to the enlarging cysts. When cardiac compensatory hypertrophy does not correspond with the constricting changes in the blood vessels, anuria will promptly develop and death will soon follow.

The outstanding change in the urine is a lower specific gravity, and this may often appear before other clinical evidence of renal insufficiency is present. Albumin, granular and hyaline casts, pus and red blood cells may also be present. The functional test for excretion of dye will vary according to the stage of the disease, ranging from a perfect return in the early stage to no excretion in the complete anuria stage in one or both kidneys.

The history and differential diagnosis study may be of great value in showing hereditary evidence and unsuspected congenital defects. Differentiation from hydronephrosis, hypernephroma or other renal tumors and from tumors or cysts of adjacent organs should be undertaken with the greatest of care.

*Gross Appearance.*—The external and fully sectioned surfaces of advanced congenital polycystic kidneys exhibit a most impressive picture, one which is not surpassed in pathologic changes of any other tissue in producing a brilliant display of blending colors in and upon convex and concave surfaces. The delicate tinting in yellow, green, red and brown, through thin-walled cysts and in multiple-sized cupped sections displays a perspective that is unsurpassed.

Both kidney specimens will show enlargement, one being larger than the other. The hilus is usually obliterated or is undergoing obliteration. The fatty capsule will be found quite generally adherent to the fibrous capsule. The external surface presents an irregular contour produced by varied sized convex surfaces of cysts. After

removal of the fatty capsule, the denuded cysts show through their semitransparent walls fluid, semifluid and solid contents derived from uriniferous secretion, blood, fixed tissue degenerations and various chemical reactions of commingled products of secretion, excretion and degeneration.

It should be remembered that the term, congenital multiple cystic kidney, or its synonyms, should not in any sense include cystic dilatation of the tubules resulting from contraction of interstitial tissue, giving the corticular surface a multiple number of pea-sized cysts. Nor does it include the single or multiple corticular cysts resulting from the absorption of embolic infarcts. Neither does it include hydronephrosis, which is a dilatation primarily of the kidney pelvis and ureter from retention due to obstruction in the pelvis itself or its ureter.

The ordinary cysts and the dilated pelvis or dilated ureter contain fluid which is but slightly colored and only rarely is this fluid hemorrhagic and purulent. But in congenital polycystic kidneys of adult life, especially after the age of forty years, there is in the majority of cases both hemorrhage and infection. In the material used in this research over 80 per cent developed these complications. The contents of the cysts varied in character from a sebaceous-like material containing fat, cholesterolin, blood pigment and albumin, to a thin watery fluid containing the constituents of urine. Often the material was colloid-like or solid.

A careful review of the literature, especially that in English, German and French, reveals divergent views of the anatomic development and differing conclusions concerning the etiology of congenital cystic kidneys. It would seem that the main reasons therefore, come from the materials studied and the paucity of illustrations accompanying the published studies. It is easy to comprehend how a most painstaking study of congenital polycystic kidneys at an early stage in a fetus could provide premises which are not set forth in the hemorrhagic and purulent kidney removed by surgical operation from the adult at forty-five years of age.

The age of the patient, age of the kidneys, age of the disease, and the serial assembling of the sectioned tissue with a range of cases to illustrate not only phases but the completed cycle in the disease are necessary to acquire the proper data for advantageous study.

The various theories of the etiology of congenital polycystic kidneys have been reviewed so frequently, that only brief references are necessary to develop certain points in the discussion of the minute anatomy.

The obstruction and inflammation theory of Virchow attributed the cause of the condition to uric acid and lime infarcts and a succeeding intrauterine papillitis which produced atresia and obliteration of the collecting tubules with cystic



changes in the capsule of Bowman. The theory was based mainly on the apparent increase of connective tissue and small, round-cell infiltration. Moschowitz refuted this theory by pointing out the fact that the connective tissue was not increased but it was the fine fibrillar sparsely cellular variety with an increased undifferentiated intercellular substance,—the embryonal type found in all undeveloped kidneys. Busse followed Moschowitz in directing attention to small, round cells being also a normal feature in all embryonal tissues. Then a number of cases were reported without a papillitis and the theory was insufficient as it gave no explanation of the frequently associated congenital anomalies.

In 1880, or just twelve years before Virchow's last modification of his theory, Brigidi and Severi advanced the idea of the condition being a cyst-adenomatous or new growth change because epithelial sprouts extended from the tubule walls, and the layers of epithelial cells in many of the tubules were increased. Busse criticized this idea by referring to the fact that these observations could be duplicated in all embryonal kidneys. Then Williamson called attention to the unlikelihood of a tumor being always bilateral.

The third theory was advanced by Von Mutach and is based upon a conception of maldevelopment in the kidney whereby the union of straight and convoluted tubules fails to take place. This theory has been amplified by different writers to include several possible modes of origin as:—

1. The persistence of the "anlagen" or rudiments of uriniferous tubules in the vesicular phase of development and their later expansion.
2. The failure of the S-shaped anlagen of the uriniferous tubules to unite with the straight collecting ducts.
3. The failure of the uriniferous tubules to join the collecting ducts of higher orders (later generations) after having become detached from such ducts of a lower order.
4. The belated appearance of disconnected cavities in a uriniferous tubule which had remained solid during formation.
5. The secondary compression of collecting or secretory tubules due to a local inflammatory process, as congenital syphilis for instance, or other pathological changes.

Kampmeier, a recent writer, after a study of human embryos, has concluded in a paper entitled "A Hitherto Unrecognized Mode of Origin of Congenital Renal Cysts" that "every human individual during his fetal life normally passes through a period characterized by the presence of numerous cystic renal tubules." This normal event he believes may be converted into an abnormal pathologic condition if such tubules do not give way at the end of their allotted time but continue to grow and expand to the detriment of adjacent normal structures. Then renal cysts might readily be produced.

An interesting viewpoint concerning the cause of this and other malformations of the kidney is raised in the report given by Fox and Penrose in their recent work "Disease in Captive Wild Animals," that in 5365 autopsies upon wild animals, abnormalities of size, shape and position so frequently reported in the veterinary literature of domestic animals were singularly absent in their material. The question is asked by these writers, "Shall these abnormalities be considered as due to degenerative changes in cross bred animals or as the result of the strain of domestication?"

The persistence of embryonal unfused lobules of the kidney is very seldom found in the domestic animals. In the cow the mature kidney is lobulated; this, however, is not a malformation. The congenital cystic kidney occurs in all domestic animals and its origin is credited to cessation of growth, with or without union of convoluted and collecting tubules. The individual cysts are regarded as embryonal retention types. Joest is reported as having seen a solitary cyst in a dove's egg and an adenoma of the size of a walnut in the kidney of the same case. This is thought by Henschen to suggest the dysontogenetic nature of kidney cysts. Joest, Lauritzer, Degen and Brueckelmayer have found one case of kidney cysts (the type is not stated) in 250 butchered pigs, which is more frequent than the occurrence in the human (1 in 350).

#### A STUDY OF FOURTEEN CASES OF BILATERAL POLYCYSTIC KIDNEYS

Congenital polycystic kidneys are the most important deformities of the urinary system because of the extensive degree of involvement, its progressive character and marked tendency to hemorrhage and infection, as is well shown in the series of fourteen cases here reported. (Figs. 1 to 23.)

The gross examination of the entire material shows in addition to the characteristics already noted under the general discussion, the uniform predominating position of the majority of the well-formed cysts to be in the cortical and subcortical zones, and the oldest and largest formations at or near the fusion line of the lobules. The medullary and pyramidal divisions were always of irregular appearance, excepting in the types which had matured in adult life. The microscopic examination, however, always enabled the finding of incompletely formed pyramidal areas and indented calyces.

After the subcortical zone the cysts were most prominent near the arcuate areas. In the younger specimens there appeared a prevailing tendency to atrophy of the ureters (Fig. 6), a condition seldom seen in other deformities.

The tendency to more or less complete obliteration of the kidney pelves was less marked in the specimens from adult life.

A brilliant display of color shadings was observed through the cyst walls of the young uninfected specimens as well as in those of adult life where hemorrhage and purulent infection had taken place.

In all cases the paradoxical appearance was present of increase in weight and size with a very pronounced diminution of kidney tissues.

The clinical histories for the fourteen cases, together with brief notes of the weights or measurements have been summarized, there being no other special features of interest beyond those reported in the general literature.

CASE 1.—A five-months fetus, with the following malformations: Multiple cystic left kidney; meningo-encephalocele occipitalis; luxation of the knee; and hyperdevelopment of the uterus.

The cystic left kidney measured 22 mm. long. The right kidney measured 29 mm. in length. Cysts appeared in the capsular and arcuate zones. (Fig. 1.)



Fig. 1.—Case 1. Showing interlobular fusion space, a potential cystic area, and interlobular insertion of capsule.

CASE 2.—A full term fetus, exhibiting malformations as follows: Bilateral multiple cystic kidneys with ureteral atresia and dilatation of one kidney pelvis; and celosomia and aspalasoma (clefts in upper and lower part of body trunk, with eventration).

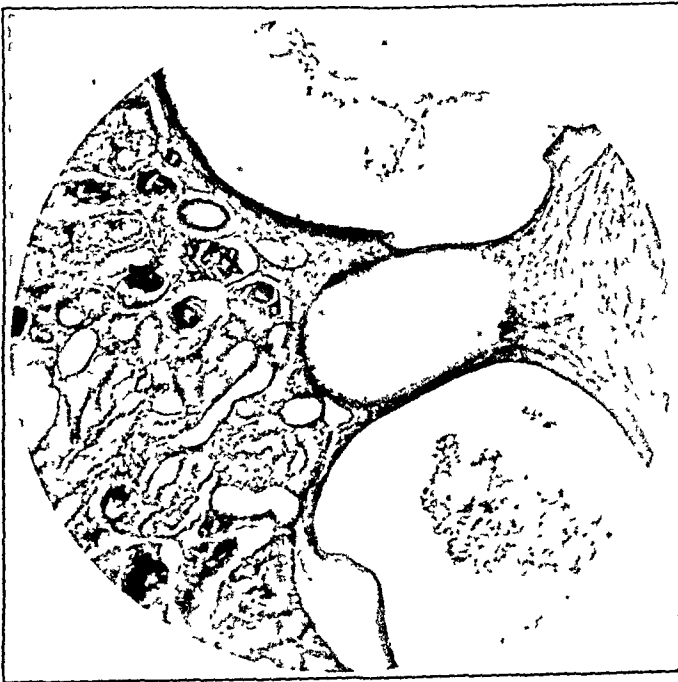


Fig. 2.—Case 2. Three cysts at the interlobular fusion line in the subcapsular zone.

The right kidney was 25 mm. long. The left kidney was 21 mm. long. Cysts appeared in the cortex and medulla of both kidneys, with relatively many more



FIG. 3.—Case 2. Showing cysts in an undeveloped pyramid, also early differentiation of a few straight tubules.

in the cortex. Undifferentiated small, round cells were also observed. (Figs. 2, 3, and 4.)

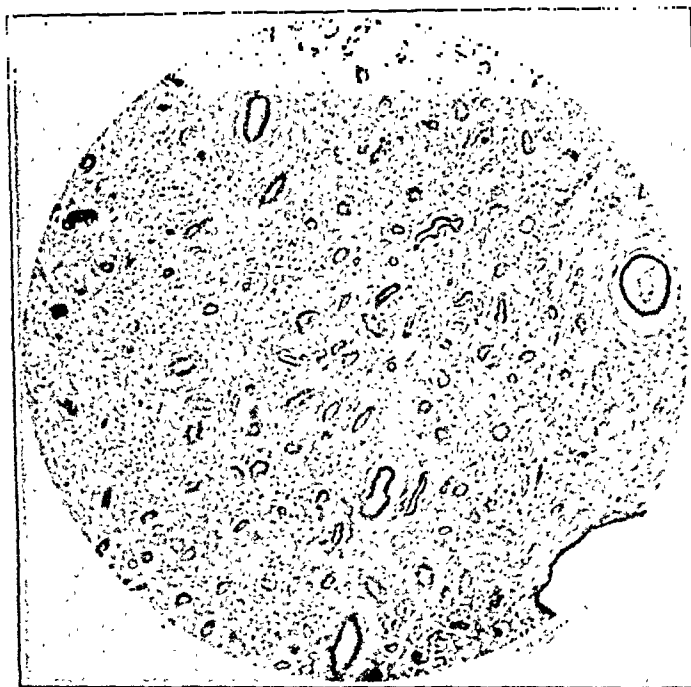


FIG. 4.—Case 2. Pyramidal tissue with relative dominance of stroma, developing tubules, a few of which are cystic. A comparable picture to interstitial nephritis.

CASE 3.—A full term fetus. The following malformations were evident: Bilateral multiple cystic kidneys and hydroureters; also meningocele with hypoplasia of cervical vertebra.

Average length of kidneys, 40 mm. Cysts were present in cortex and medulla, but chiefly in the capsular zone. (Fig. 5.)

CASE 4.—A one-day-old, colored, female child, weight 5 lbs. 2 oz. The following malformations were exhibited: Bilateral multiple cystic kidney, and atresia

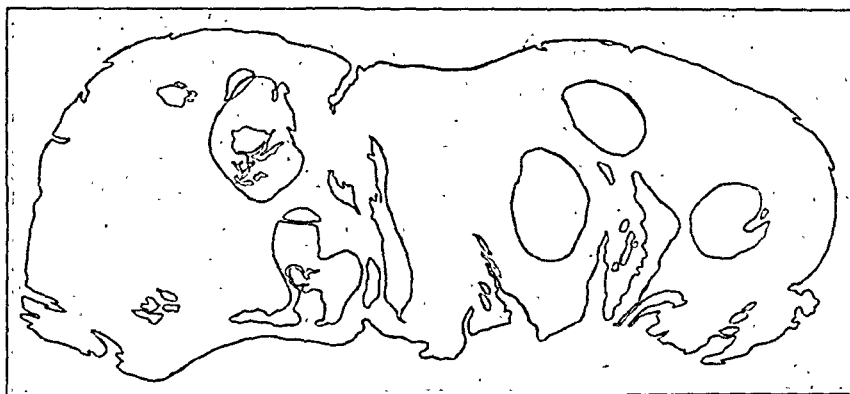


Fig. 5.—Case 3. Outline drawing of sectioned surface showing multiple cysts.

ureters; bilateral talipes valgus and calcaneus, with outwardly curved tibia, and enlarged thyroid gland.

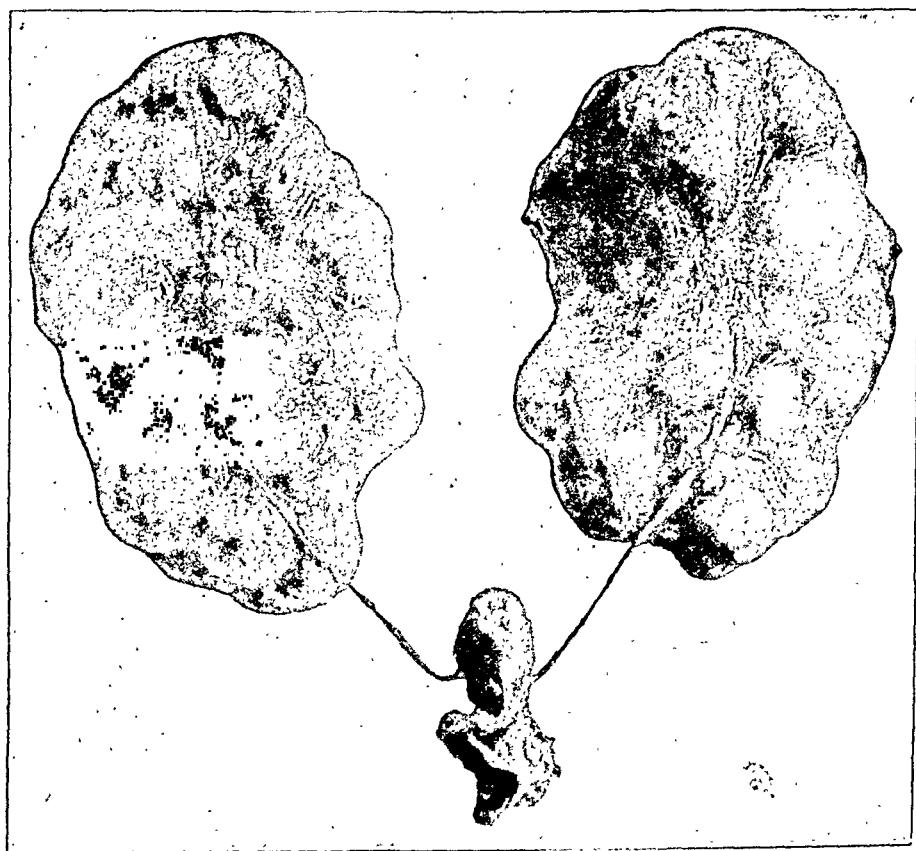


Fig. 6.—Case 4. Congenital cystic kidneys from a one-day-old colored child. Atrophic ureters and bladder.

The weight of the kidneys was 215 gm. and their length 9.5 cm. The child died from asphyxia. This was the fourth child. The third child is living and well. The second child died at eleven days. The first child died at seven months. The

mother had lues, but the Wassermann test was negative at the birth of this child. The cysts were multiple and diffuse. Delayed development was apparent. Pressure atrophy was exhibited and there were few glomeruli. (Figs. 6, 7, and 8).



Fig. 7.—Case 4. A serial section of one entire kidney (same as Fig. 6). Only a very small amount of parenchyma and stroma developed.

CASE 5.—Adult female, aged fifty-five years, with bilateral polycystic kidneys.

The weight of the left kidney was 1750 gm., length 25 cm. The weight of the right kidney was 950 gm., length 20 cm. Hemorrhagic material and pus were found within the cystic cavities. Death occurred from uremia. Familial history

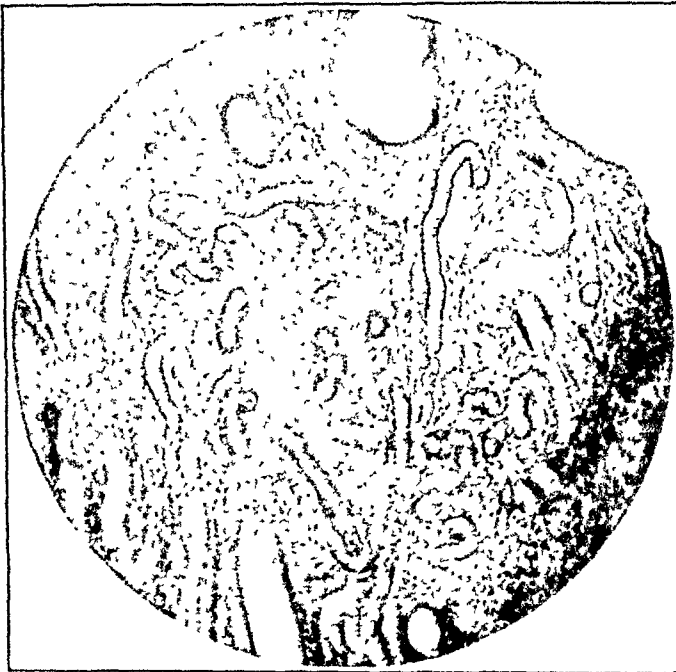


Fig. 8.—Case 4. A higher magnification of the tissue in Fig. 7. Many solid convoluted tubules are seen without glomeruli, some tubules becoming cystic.

of congenital cystic kidneys in three of her generations. Case 7 is the son of this subject. (Courtesy of coroner.) (Figs. 9, 10.)

CASE 6.—Adult female, aged fifty-four years, exhibited bilateral polycystic kidneys.

Left kidney, weight 215 gm., length 10.5 cm. Right kidney, weight 420 gm., length 16.3 cm. Hemorrhages and abscesses were shown in the kidneys. (Figs. 11 and 12.) (Courtesy of Dr. S. E. Sanderson.)

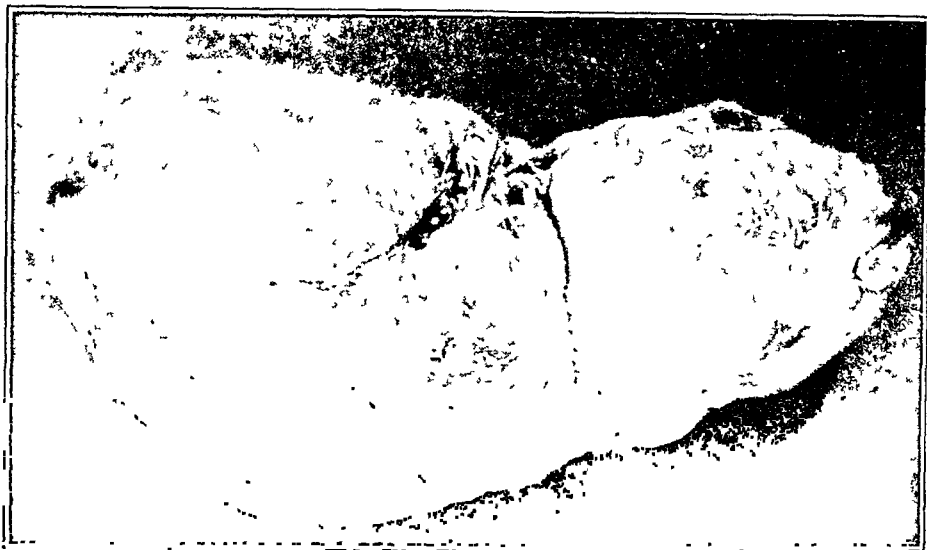


Fig. 9.—Case 5. One of a pair of bilateral adult cystic kidneys, showing a narrowed pelvis and a thickened capsule with multiple cysts.

CASE 7.—Adult male, aged thirty-two years, with bilateral polycystic kidneys and deformed sternum.

Left kidney, weight 1040 gm., length 21 cm. Right kidney, weight 760 gm., length 20.5 cm. There is a history in his generation of four relatives with con-

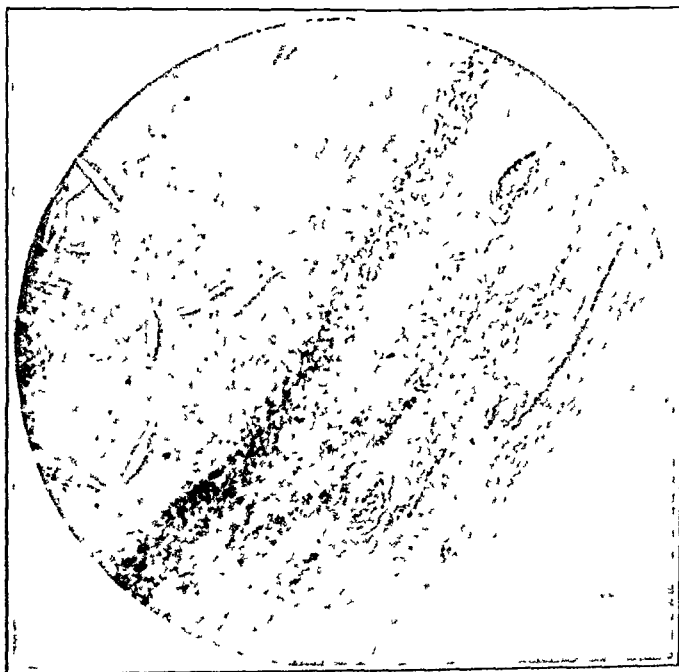


Fig. 10.—Case 5. A steatomatous cyst wall and cystic material with multiple clefts Of frequent occurrence in degenerations of congenital cystic kidneys.

genital cystic kidneys and a total of seven cases in two generations. (The mother of this case is Case 5.) Renal disease history from childhood. *Bacillus coli* infec-

tion followed a pyelogram operation, from which death is said to have resulted. (Figs. 13 and 14.) (Courtesy of Drs. Plaggemeyer and Cummings.)

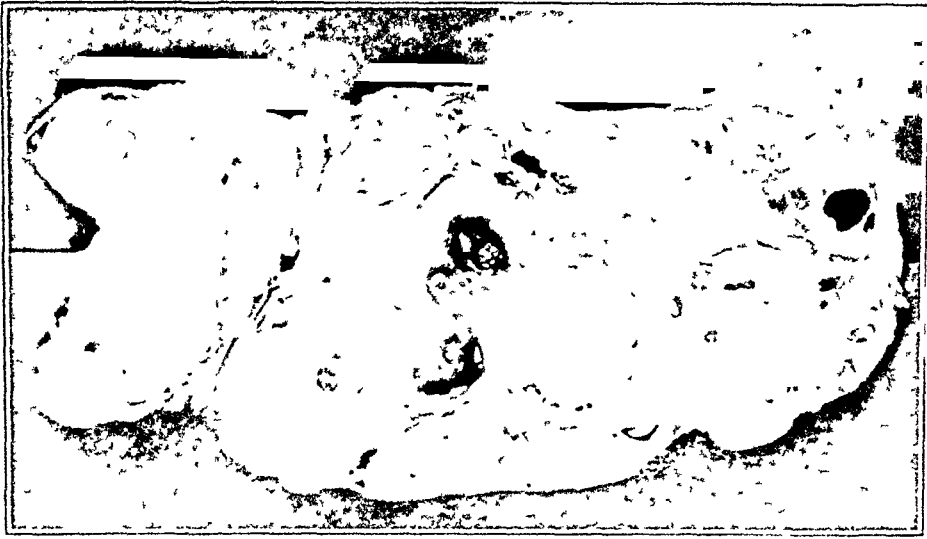


Fig. 11—Case 6 The peripheral surface of one bilateral cystic kidney, patient aged 54 years.

CASE 8.—Adult female, aged forty years, with bilateral polycystic kidneys.

Right kidney, weight 315 gm., length 14 cm. Left kidney, weight 775 gm., length 15 cm. Hemorrhage and infection occurred in both kidneys. Right kidney nephrectomy was performed and death followed in fifteen hours. Other kidney was obtained at autopsy. (Fig. 15.) (Courtesy of Dr. C. Owen.)



Fig. 12—Case 6. Infected cystic areas and contracted glomeruli (same kidney as Fig. 11).

CASE 9.—Adult female, aged twenty-two years, with unilateral polycystic kidney.

Kidney length 18 cm., width at hilum 8 cm. Size of the other kidney was four times normal at time of operation. Large peripheral cysts were found in the kid-



ney removed. Nephrectomy, patient is living, but is not well. (Probably a bilateral involvement.) (Courtesy of Dr. Jos. Andries.) (Figs. 16, 17, and 18.)

CASE 10.—Adult female, aged sixty-five years, with solitary cyst of one kidney. Length of kidney, 9 cm., breadth 8.7 cm. History of movable kidney for ten years. Had the cyst for three years. Death occurred from myocarditis one month after the operation of nephrectomy. (Autopsy not obtained, probably a bilateral involvement.) (Courtesy of Dr. Wm. Cassidy.) (Figs. 19 and 20.)

CASE 11.—Adult female, aged forty-five years, with bilateral polycystic kidneys. Kidney weighs 1750 gm., length 21 cm. (Only one kidney was obtained for examination.) Cysts contained pus and blood stained fluid. Patient's mother died at age of sixty of apoplexy, but had an abdominal cystic tumor. One child, aged

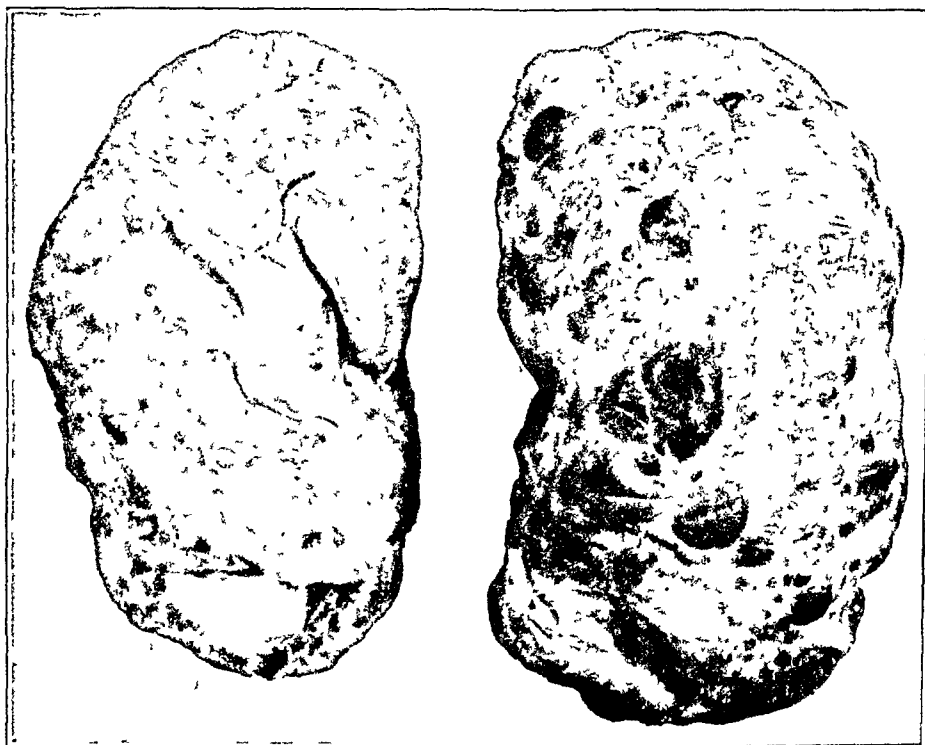


Fig 13—Case 7. Right and left congenital cystic kidneys from a patient 32 years of age who was one of a familial group of seven with this disease.

nineteen years, was living and well. Patient's condition diagnosed thirteen years before death. Died of uremia. (Fig. 21.) (Courtesy of Dr. M. C. Hubbard.)

CASE 12.—Adult, colored female, aged forty-five years, presenting bilateral polycystic kidneys.

Length of kidney 22 cm., breadth 9 cm. (across hilum). (Only half of one kidney obtained for examination.) Cysts contained hemorrhagic gelatinous fluid. Patient was a native of Kentucky, and later lived in Illinois. Died suddenly on the street. An autopsy revealed bilateral congenital cystic kidneys, with numerous echinococcus cysts. One of these cysts in the liver had ruptured. (Courtesy of Dr. H. A. Calhoun.) (Fig. 22.)

CASE 13.—Premature female fetus, seven and one-half months, showing the following malformations: Bilateral polycystic kidneys, cerebral hernia, spinal bifida, club feet, and congenital umbilical hernia.



Fig. 14—Case 7. Two typical contiguous cysts. Two closely associated compressed glomeruli

The kidneys were flattened and triangular in shape and measured 4 cm. and  $3\frac{1}{2}$  cm. in diameter. They were infected and bilateral multiple cystic formations were present. Their position was in the midline, and flattened against the diaphragm. The ureters were atrophied. (Fig. 23.)

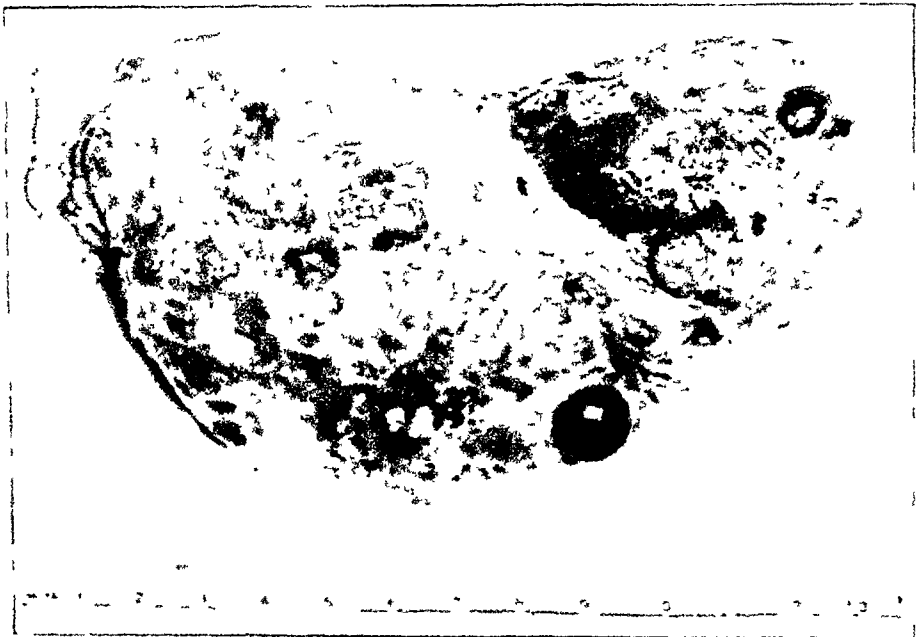


Fig. 15—Case 8. Peripheral surface on a congenital cystic kidney at 40 years. Death followed its removal in 15 hours.

CASE 14.—Is an example of bilateral polycystic kidneys in a domestic animal—the pig. No other malformations were noted. The kidneys were approximately twice normal size and contained throughout small dilated cystic cavities.

There were multiple deformities other than those of the kidneys known to be present in six of the cases.

The kidneys obtained from adults were at the following ages: An adult female



Fig. 16.—Case 9. Unilateral polycystic kidney (so-called) presenting same appearance in cross section as the congenital polycystic type. Patient aged 22, living, but with symptoms of kidney insufficiency two years after operation.

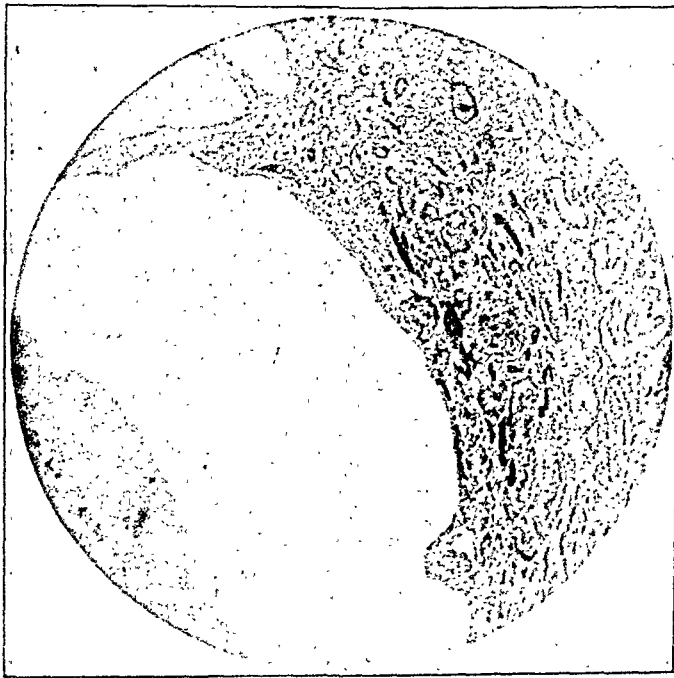


Fig. 17.—Case 9. Three cysts. Three glomeruli at the margin of the largest cyst.

at twenty-two years of age and adult male at thirty-two years. Six other cases were females at forty, forty-five, forty-five, fifty-four, fifty-five, and sixty-five years.

Two of this series of thirteen cases were blood relatives and other members of their family have been diagnosed as having the same condition of congenital bilateral polycystic kidneys.

In three instances nephrectomy was performed: One of these cases is living, but is not in good health, another case died in one month from cardiac cause, and the third case died within twenty-four hours after the operation.

Six pairs of adult kidneys exhibited multiple hemorrhages or pus formation filling many of the larger cyst cavities. (Fig. 12.) In one case there was a severe purulent infection requiring external drainage at two different times in a period of ten years preceding the time of death.

In one case noticeable subjective symptoms were recorded from early childhood to the time of death at thirty-two years.

Two of the cases occurred in colored people. One of these in a one-day-old child, case 4, and there was a maternal history of syphilis.



Fig. 18.—Case 9. Magnified section from kidney shown in Fig. 16. Large cyst in center with papillary projections. Wrongly interpreted by Brigid and Severi as evidence of a new growth change.

*Histopathology.*—The most conspicuous tissue changes in congenital cystic kidneys are the incompleteness of development in the unit structures, the incomplete assembling, the cystic degeneration and consequent pressure atrophy. The resulting deformation is strikingly uniform throughout the entire organs when the disease has reached the mature stage, even if the tissues are young or old. In fetal tissues there were in some ways an appearance of advanced ageing due mainly to the smaller number of glomeruli and their more matured sizes as they developed in the last generation just beneath the capsular border. But in adult tissues there were striking effects giving the appearances of defective development and premature ageing. There were areas with solid segmental tubules or with aggregations of cells



Fig. 19.—Case 10. So-called solitary cyst.

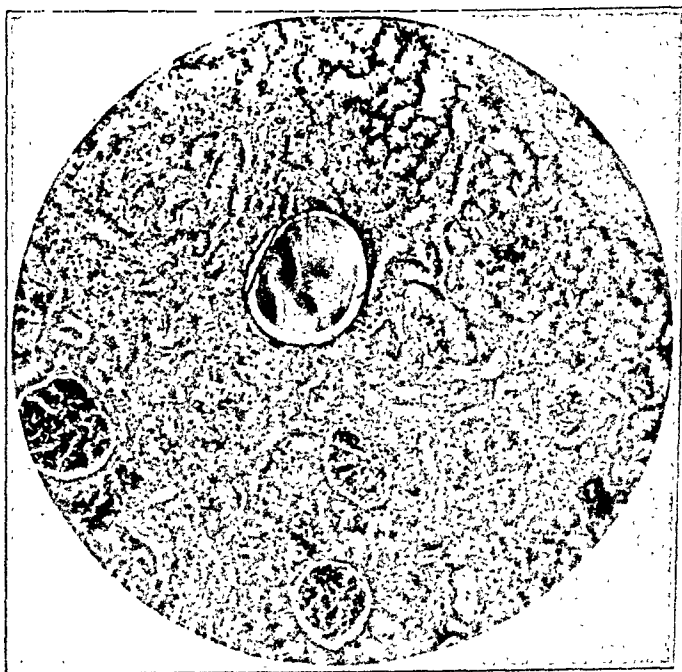


Fig. 20.—Case 10. Cystic Bowman's capsule. Four contracted glomeruli. Part of capsule at upper right periphery.

which were but partly differentiated into tubules. The incompleteness of development may be systematically looked for in the capsule, cortex and medulla. When the capsule is incompletely differentiated, a most interesting opportunity is afforded for observing isolated dif-



Fig. 21.—Case 11. Typical adult polycystic kidney at 45 years, capsule thin, pelvis obliterated.

ferentiations of tubules in this metanephrogenic structure which may in some specimens be equally as wide as the glomerular zone. This occurred in Case 13 of this series. The formation of tubules appeared



Fig. 22.—Case 12. Sectioned surface showing multiple cysts. (X 54.)

identical with that observed in a teratoma of nephrogenic origin and with the illustrations by Rienhoff from the explants of chick embryos. The essential mesenchymal structure of this capsular zone was richly cavernous and the spaces were lined with cells of both epithelial and

endothelial morphology. In recessed parts of the cavernous border the cells were two and three deep. Where the border was not recessed, almost complete denudation of lining cells had occurred. The cavity areas were quite generally partly filled by a cellular, homogeneous, light blue material. Here and there at isolated areas quite remote from the glomerular zone were small nests of early tubule formation. In one of these a well-formed sigmoid portion of a tubule could be identified. As observed in the previous paragraph, the generation of glomeruli at the upper border line was reduced in number and only a few of the glomeruli were distinctly immature in size, making a contrast with the condition usually seen at this age, when the upper or last glomerular generation is noticeably crowded.

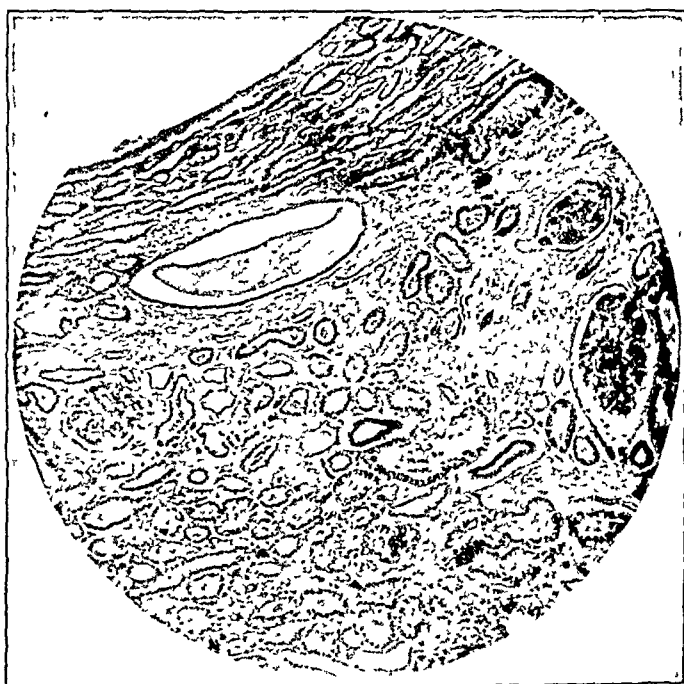


Fig. 23 —Case 13. Two cysts in upper part of the field. Three deformed glomeruli

*Demarcation of the Cortex and Medulla.*—The cortex and medulla were more or less indifferently demarcated. The corticular zone with glomeruli, convoluted tubules and arcuate vessels and with a slightly stronger selective acidophilic affinity (hematoxylin and eosin stain) was usually more prominent and occupied a larger part of the field. The medulla very frequently in the younger tissues could only be recognized by the indentures of the calyces and the presence of only a few representatives of the different orders of tubuli collectivi. The cellularity of these parts was always numerically greater for the area occupied than that of a corresponding area in the cortex and its reaction to the hematoxylin and eosin stain was more selective of the nuclear action. The development of the segments of collecting tubules

was quite in contrast with that of the convoluted or urinary type. The designation—straight tubules—is truly descriptive, even for the developmental stage, as the cells are found arranged in a solid column-like segment persistently disposed to maintain an approximately straight axis. The formation of a lumen in the collecting tubules appears relatively earlier than that of the uriniferous tubules. The convoluted tubules at a very early stage show evidence of the inherent tendency to curve by their short comma and later sigmoid forms. The regular assembling of the pyramids with the intervening columns of convoluted loops (columns of Bertini) is never complete in congenital polycystic kidneys. In some of the specimens where the disease was of late maturity and the number of cysts relatively small, there was some degree of regularity but seldom was this distinct and complete enough to enable naked eye recognition. It is convenient and perhaps systematic to discuss the subject of incompleteness of the anatomic unit structures in congenital polycystic kidneys in a division apart from that of the capsule, cortex and medulla, because the literature relating to the etiology has to a very large extent been concerned with the tubules.

*The Situation of the Cysts.*—The positive statement can be made in regard to the situation of the cysts in the disease that the material of this series shows cysts in the capsular zone, cortex and medulla, and that they were most frequent in the subcortical zone at the fusion line of the lobules. (See Figs. 2, 7, and 16.) Small, medium and large sized cysts have been observed within the metanephrogenic zone before the completion of differentiation of the capsule. The tissue changes in this zone had been interpreted as recessive and developmental—recessive because of disappearing epithelial and endothelial lined cavernous areas—progressive because of differentiation to higher types of tissue at different places in the zone. The cystic degeneration has involved only certain of the cavernous areas.

*Cysts in the Cortex.*—Within the cortex two sources have been observed from which cysts developed; one was the glomerular capsules and the other was from within the uriniferous tubule segments. In two kidneys from the series, Case 13, the glomeruli showed both degenerating and developmental changes. In many instances the capsule was large and the glomerular mass had degenerated to the extent that only a few pyknotic and granular cells remained in a homogenous, gelatinous, slightly blue staining mass in place of the glomerulus. In other instances actively glomerular masses snugly filled the capsule. In a few places divided glomeruli were observed and as many as three distinctly separated glomerular masses could be seen developing within a single capsule. In the largest capsules where the cavities were filled by gelatinous material, the lining cells showed atrophy and the cells contiguous to the capsule were compacted from pressure.



The general appearance of the convoluted tubules differed in Case 13 from that found in any or all of the remaining 13 cases because the usual delayed development found in these units was not present. The nests of comma-shaped solid, or partially dilated tubule segments, were not observed. There was an unusual number of primitive vessels with exceedingly thin walls scarcely demarcating the canals which were filled by hemolyzed red blood cells. This phenomenon with the delayed development of the capsule and an advanced development of the indentations of calyces and collecting tubule orders, together with a high anatomic position of the organs directly against the diaphragm, was indicative of an unusual growth impulse in the craniad migration of the ureteric bud which was doubtless carried well up into the realm of mesonephric tissue.

In these kidneys there were cysts in the medullary tissue as well as in the corticolar and capsular zones.

*Formation of Cysts in the Uriniferous and Collecting Tubules.*—Already mention has been made of the formation of cysts within the cavernous areas of the capsular zone and within the glomerular capsules as a concomitant of degenerative processes. It is more difficult to reach conclusions as to cystic changes in the uriniferous and collecting tubules. It is easy to conceive of reasons for the formation of simple cysts in tubules, such as develop in the course of many infections, interstitial tissue increase, infarction, etc., but it is not so easy when the condition begins in undeveloped tissue presumably at an early period of fetal life, loaded with potentialities for diffuse progressive involvement inconsistent with life to the end of the fetal period or consistent with fair health for the usual expectancy of life. The formation of cysts of this character from the tubules is more difficult to explain because causative degenerative conditions are less evident and the factor of developmental irregularities within the tubule segment is obscure.

*Contrasts in the Tissues at Different Ages.*—It has been observed in this series of cases in all of the tissues representing the different ages from the five month's fetus to the infected case of sixty-five years, that the tubules exhibited two widely contrasted conditions, one in which differentiation or development was going on, and the other a progressive increase in the size of cysts with consequent diminution of the kidney parenchyma and stroma by pressure atrophy, fibrosis and hyalinization. In the older kidneys the areas of local differentiation of tubules occurred almost exclusively in the lower portions of the medullary tissues, but in younger kidneys it occurred extensively in both cortex and medulla. The tissue differentiation might easily be mistaken in single sections for a chronic inflammation with infiltrating mononuclear cells, but with serial sections one easily recognizes and follows the course of a tubule which in certain portions of its length is a

solid narrow mass of cells approximating the ordinary tubule in size but in other parts it possesses a lumen. In remaining portions it shows unassembled or partially assembled cells at certain levels of the block. At lower levels these cells become fully assembled as a completed tubule. The building process is not easily seen as an end budding plan but is an extensive lateral assembling method. It is frequently possible to find in the narrow septal wall between two contiguous cysts an irregularly developing tubule extending a long distance in the wall tissue. The question naturally arises: are the large cysts old tubules and are the newly forming tubules a delayed order of these structures, or is the condition but an inherent character of the mesenchymal stroma to differentiate a higher type of tissue—the latter view is in closer keeping with the natural law of tissue biology. Support for this view is shown in the teratomatous tumor of nephrogenic origin and also in the fact that the kidney at sixty-five years of age shows the same ability, but in a limited way, to carry on this differentiation process. In the tissues of Case 4, the one-day-old child with a matured stage of the disease in both kidneys, there is everywhere throughout the entire mass of the kidney serially sectioned, active differentiation going on excepting where the pressure atrophy from large cysts has perceptibly degenerated the cell protoplasm.

Notwithstanding the lack of evidence in visible degenerative tissue changes in the tubules at the time cystic changes begin, there is plainly shown the varying behavior of the solid tubule segments where one part of the same develops a lumen for a short distance and becomes enlarged and later is filled with fluid, while other parts of the same tubule remain solid and its continuity with the remainder of the unit is never completed. (See excellent examples of these conditions in Fig. 8.) Yet along side of these tubules with this irregular history are other tubules which succeed in developing and are in many instances capable of maintaining adequate function along into old age.

*Infection as a Cause.*—At the period of life when the normal kidney becomes more liable to infection, the congenital polycystic kidney, too is frequently infected. This is shown in approximately 80 per cent of the adult cases of this series. In most instances hemorrhage preceded the infection. Many of the larger cyst cavities had become filled with blood and pus. (Fig. 12.) The evidence presented in this material of infection being the cause of the condition was negligible. In only an occasional area was there the slightest suggestion of recognizable reaction to infection. A few localized areas showed active fibroblastic proliferation. In Case 4 there was a clinical history of maternal syphilis but the Wassermann reaction was negative at the time of birth and a very diligent search for the *Spirocheta pallida* in the tissues of the child gave negative results. The fact that seven cases related to this series represented a familial group for the dis-

ease supports the evidence already in the literature of a congenital basis for the etiology of the disease.

*The New Growth Theory.*—The theory of Brigidi and Severi is not supported by evidence obtained from this study. Attention has already been called to the inherent disposition of the mesenchyma to differentiate into tubules. This is a developmental change of one tissue to another tissue of higher type and not a differentiation yielding a lower form of cells and tissue as is always the case in either benign or malignant new growths. Then again, there is the increase in size of the organs of the tissues, which become more compacted as the disease matures, due for the most part to pressure from the increasing contents in the cyst cavities. There is also the fact that when the disease is most advanced and the organs are of maximal size, growth is minimal. This is quite opposed to the condition prevailing in new growths.

*The Theory of Nonunion of Tubule Segments.*—This study does not support the theory that a failure of union between the convoluted and collecting tubules has been the single cause for the formation of cysts for, as already pointed out, cysts were observed in cavernous areas of the developing capsule and also in the capsules of degenerated glomeruli, as well as in positions where defects in tubule connection could take place. The evidence that all of the causative factors for the formation of the cysts may be active at widely varying periods of time is quite convincing. It is well known that the disease has potential phases of development without direct relation to the age of the body. It has been shown at the operating table that one kidney may present the classical gross appearance of the congenital polycystic kidney while the companion organ is apparently normal. Yet only a short period of increased function may be required to force the kidney so recently normal to gross examination, to a condition of typical polycystic degeneration.

The microscopic examination of these same tissues has shown cysts in different stages of growth. Some were just forming in local parts of the tubules which were yet in primitive developmental stages of progress. There were also aggregations of cells which showed differentiation activity towards tubule formation.

*It is of very great importance that the deformations of the urinary organs are usually a part of a multiple group of stigmata and that the condition of congenital polycystic kidneys is frequently associated with the same type of degenerative change in other organs, as, for example, in the liver in 19 per cent of all cases reported in the literature and also with various deformities in other parts of the body.*

*It is logical to conclude from the evidence gathered in this study that congenital polycystic kidneys are caused by defective protoplasm which may be inherited or congenital in obedience with the same bio-*

gonococci; in 6 cultures, *S. viridans* alone; in 2 cultures, *S. viridans* with gonococci; in 2 cultures, *S. viridans* with *B. coli*; and in 1 culture, *S. viridans* with staphylococci.

The classification of the streptococci by means of carbohydrate fermentation tests are indicated in Tables III. and IV.

In litmus milk the hemolytic type formed acid in all, with coagulation in two. The viridans formed acid with coagulation in most strains.

Eleven of the 13 strains of *Streptococcus hemolyticus* from the tubes proved to be *Streptococcus pyogenes*, one *Streptococcus subacidus*, and one could not be classified according to Holman's classification. Two of the 4 strains of *Streptococcus hemolyticus* from the cervixes were *Streptococcus pyogenes*, one was *Streptococcus infrequens*, and one *Streptococcus anginosus*. Eleven of the 17 strains of *Streptococcus viridans* from the tubes were *Streptococcus mitis*, 4 were *Streptococcus salivarius*, one *Streptococcus fecalis*; while from the strains of *Streptococcus viridans* from the cervix 4 of the 6 strains were *Streptococcus mitis*, and 2 were *Streptococcus fecalis*. The classification of Smith and Brown did not prove clear cut and definite as the *Streptococcus hemolyticus* of the alpha type resembled the *Streptococcus viridans* in cultural characteristics and pathogenicity except for the narrow zone of hemolysis outside of the area of green.

The pathogenicity of the various strains of streptococci was tested by injecting the sediment suspended in sterile normal saline obtained by centrifugalizing 20 to 25 c.c. of the forty-eight hour ascitic-broth cultures of the viridans type and 3 to 4 c.c. of the forty-eight hour ascitic-broth cultures of the hemolytic type intravenously into rabbits (700 to 1,000 gm.).

The following experiments illustrate the usual findings produced by the different types of streptococci:

**RABBIT 1.**—Twenty c.c. of a forty-eight hour culture of *Streptococcus hemolyticus* of the alpha type isolated from the cervix of patient No. 2 were injected intravenously. The rabbit in dying condition was killed at the end of four days. Autopsy revealed a serofibrinous exudate in left hip, left knee, left ankle, left third interphalangeal, right wrist, and tenth intervertebral joint. Hemorrhages into the endocardium, cloudy swelling of liver, kidneys and spleen were present. The cultures from the heart and from the exudate of the infected joints yielded *Streptococcus hemolyticus* of the alpha type.

**RABBIT 2.**—Four and five-tenths c.c. of a forty-eight hour ascitic-broth culture of *Streptococcus hemolyticus* of the beta type isolated from the fallopian tubes of patient No. 4 were injected intravenously into a rabbit. Eight days later, the rabbit was in poor condition and was killed. A marked purulent arthritis and tenosynovitis of both ankles, of left metatarsophalangeal joints and of both wrists were found. Hemorrhages into the muscles of the right arm were present. The parenchymatous organs revealed no gross pathology. The cultures from the heart's blood and from the exudate of the infected joints yielded *Streptococcus hemolyticus*.

**RABBIT 8.**—The sediment from 20 c.c. of a forty-eight hour ascitic-broth culture of *Streptococcus viridans* isolated from the fallopian tubes of patient No. 9, suspended in sterile normal saline, was injected intravenously. The rabbit died at the end of seven days. The postmortem examination revealed a seropurulent exudation in the right ankle, right knee, right inferior prepatellar bursa, right second and third metacarpophalangeal joints and in the left knee, bursa, left third, fourth, and fifth metatarsophalangeal joints. The parenchymatous organs revealed no gross pathology. The cultures from the heart's blood gave no growth, while the cultures from the exudate of the joints yielded *Streptococcus viridans*.

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111 JOSEPHINE AVENUE.

## THE RELATION OF DYSMENORRHEA TO INTERSTITIAL THYROTOXICOSIS AS PROVED BY THERAPEUTIC MEASURES\*

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### PREFATORY NOTE

THIS essay is a review of a study of the clinical phases of some of the endocrine disturbances of the female. Though based upon and guided by studies of pathology, this phase is but casually considered. Theories and hypotheses are ignored because, though indulged in by many writers, they seem to have added but little to our everyday working knowledge.

I have confined myself as much as possible to the presentation of facts as I have seen them in the clinic. Though necessarily presented in an abbreviated form because of the wide range covered, I believe even this brief presentation carries evidence of a close relation of thyroid dysfunction to menstrual disorders. Neither space nor time is available for a full presentation of the clinical results in detail, but I feel sure the results presented bear a close relation to the facts.

That there is some interrelation of the various endocrine units to

\*Abstracted from Thesis, American Association of Obstetricians, Gynecologists and Abdominal Surgeons.

each other is generally recognized although no exact information of such relationship is satisfactorily proved. The relation of the ovaries and the thyroid gland, however, is as well established as any. Even here the association is not clearly understood. One reason, perhaps, is that all pelvic disorders have been compared with all diseases of the thyroid gland. Obviously it is necessary to consider only the endocrine disturbances of the ovaries with definite types of diseases of the thyroid gland. A second necessary restriction of the field of investigation is to analyze the various diseases of the thyroid gland and study the relation of ovarian disturbances to each of these in turn.

This essay undertakes to segregate endocrine disturbances of the ovary with the type of goiter most intimately associated with ovarian disturbances, notably the interstitial type. It furthermore undertakes to select the primary disturbing factor and by correcting this to secure relief from the disturbances caused by such deviation from the normal in each of these. Unfortunately we know nothing whatever that relates to structure and function in the case of the ovary but in the thyroid gland we are able to say with great definiteness that certain structural changes are associated with a particular symptom group. In the former we must decide deviations from the normal wholly on clinical grounds while in the latter we have both clinical and anatomic evidence.

The necessary premises in this study are an understanding of the types and causes of dysmenorrhea and the types of goiter. If we confine ourselves to those facts reasonably well established, as applied to the restricted field of this paper, each of these may be considered in a very brief space.

For the purposes of this study those cases of dysmenorrhea only need be studied which appear to be purely ovarian in origin. That is, those cases in which there is no obvious gross pelvic lesion, notably maldevelopment, displacements, tumors and pelvic inflammations. Even in the presence of such lesions the dysmenorrhea is not necessarily dependent on them as will be noted further on, since the painful menstruation may be relieved without the relief of the anatomic lesion and conversely, relief of the anatomic lesion may not cure the dysmenorrhea.

Experience has proved that in the absence of gross pelvic lesions attempts at relief by mechanical means, of menstrual disturbances are worse than useless. Correction of ante flexion, dilatation and curettage, operations on the cervix to relieve a hypothetical stenosis, all mark the fallacy of the hypothesis of mechanical causes in the production of dysmenorrhea. If after a careful examination of the young sufferers under general anesthesia no organic lesion can be demonstrated, so far as our present knowledge permits us to judge, we are safe in regarding the dysmenorrhea as functional, that is, of

endocrine origin. We may cease then to study the pelvic organs and begin a study of the patient. Anatomic study of ovaries has given distressingly little knowledge by which we may determine dysfunction. It is worth while, however, to consider what little we do know.

#### PATHOLOGY OF THE OVARIES IN DYSMENORRHEA

It was my unhappy privilege, more than twenty years ago, to serve as resident pathologist in a hospital where the operators removed ovaries on any pretext. One of the chief indications was for the relief of dysmenorrhea. I learned from a study of this material to divide these ovaries into three groups; wholly normal ovaries, ovaries with inflammatory lesions, and atrophic ovaries. The first type was represented by about 95 per cent, the second by 4 per cent, and the last by 1 per cent.

*The Normal Ovaries.*—Though the appalling sacrifice of normal ovaries by operation is happily, largely a thing of the past, there is now and then evidence of the persistence of such error. In a recent number of a report from the College of Surgeons, a sample operative report card notes the removal of the appendix and the right "cystic" ovary. It is deplorable that this all too common error should be flaunted before the young surgeons of the present day as a model. In my laboratory days the old spectacle of a normal appendix and a right "cystic" ovary greeted me time without number until I thought the very gods must soon cry out in protest. Given a young woman with pain in the right side, the diagnosis of the mythical chronic appendicitis, operation, the operator finds nothing to explain the symptoms, and the innocent ovary, because it has "cysts," pays the penalty of topographic association with the appendix. There is still a woeful lack of knowledge of the wide variation in the form and structure of ovaries capable of carrying on the normal function, it is true, but we are not so lacking in knowledge as to make excision of cystic ovaries justifiable. The so-called conservative operations on the ovaries are nothing more than inane meddlesomeness designed to compensate for a poor clinical analysis of the patient's condition. The variations in the size and number of small cysts is limitless. Even the so-called small cystic ovary, thought by many to be pathologic, is wholly capable of performing a normal function. So long as there are normal follicles, or even normal medullary tissue, the ovary is capable of carrying on its function, and there is no more reason for performing operations on the ovary for the relief of pain than for performing a cerebral decompression for migraine. That the most extreme degree of thickening of the tunica and the more ornate collection of cysts is compatible with normal and undisturbed function and that ovaries devoid of any anatomic deviation from the normal may be the seat of so-called ovarian pain, is a bit of fundamental knowledge that should



be in the possession of every one believing himself possessed of sufficient knowledge to warrant him to appear as a surgeon.\*

*The Inflammatory Ovary.*—These ovaries came to the laboratory only because they were associated with inflamed tubes. The ovaries were removed only as a matter of technical expediency or the failure to recognize the fact that the ovaries were unfortunate innocent bystanders. So far as the function of the ovaries go, this function is not affected by these influences. Only in rare instances when there is marked secondary atrophy is the function impaired. Even in these, though attended by disturbed menstrual function the endocrine activity is not wholly lost.

*Atrophy of the Ovary.*—Occasionally there is a premature atrophy of the ovaries apparently as a part of a generalized endocrine disturbance. Ovarian atrophies are of two general types. The one, an asplasia rather than an atrophy, is seen in thin, anemic, substandard girls. In this type there is never an entire absence of interstitial tissue and a few follicles are present though they may be poorly formed. The other type is seen in women who take on enormous weight. This latter type is usually a secondary atrophy leading to a premature menopause. In these there is a definite sclerosis of the ovaries. In these there may be a total disappearance of both interstitial cells as well as follicles, there remaining but a small nub of connective tissue which is fibrous throughout. In many obese patients, however, with amenorrhea, the disturbance is functional without anatomic changes in the ovaries.

This very cursory review of the pathology of the ovaries is sufficient for a basis of the arguments which are to follow. Let it be repeated that it is not possible to examine ovaries and declare the possessor suffered thus and so. The atrophic ovary, the large cystic and the rest may be found in patients who do not suffer from dysmenorrhea. Conversely, when such ovaries are found in patients who do suffer from dysmenorrhea, it does not follow that such changes are associated with dysmenorrhea or that any tinkering with the ovaries will influence the pain.

#### PATHOLOGY OF THE THYROID GLAND

The relation of anatomic change to disturbance of function in the case of the thyroid gland is definite. There is no other organ from which the disturbance caused by a given lesion can be so certainly determined and, conversely, there is no other disease in which the

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\*I may say in passing that I once surreptitiously substituted pig ovaries for human ovaries in a series designed for demonstration at a medical meeting, removed by one of our renowned ovariologists. He rent the air with eloquent descriptions of the patient writhing in agony in the beginning of menstruation caused by the cystic ovaries he held before him and how a beneficent Providence had sent surgery to relieve these sufferers. I was forced to reply, in justice to simple truth, that nothing was known of the clinical symptoms because this particular pig had died an ignominious death in the slaughterhouse. So little did this operator know of ovarian pathology.

anatomic findings can be so certainly predicted as in the diseases of the thyroid gland. For the purpose of this paper we may exclude mere disturbances of function as is manifest in the increase in the colloid without change either in the character of the colloid or in the histology of the cells. We may exclude also that type in which there is marked adenomatous proliferation as seen in the toxic or exophthalmic toxic types.

We may address ourselves, therefore, to the remaining type of goiter, notably, the interstitial type. Since this type is not generally recognized the establishment of this form of goiter as a clinical entity must be one of my chief tasks.

*Interstitial Goiter.*—It is my purpose merely to call attention to the presence of interstitial cells in unusual numbers in certain types of mild thyrotoxicosis attended by more or less marked neurotic symptoms and very commonly by dysmenorrhea. It is of equal importance to note at the outset in this type of disease that the usual anatomic changes attending typical cases of thyrotoxicosis are absent.

*Anatomic Consideration.*—When we consider the fundamental question as to whether or not there are any cells at all in the thyroid gland comparable to interstitial cells of other organs, we find no help in the literature. None except Goetsch and myself have written on this subject. Assuming, as pathologists do, that the masses of cells in the interstitial tissue to be acinal cells which have not acquired a lumen, explains nothing. Taking the histologist's viewpoint one would need to regard them as the result of imperfections of development. If we reason by analogy there is more reason to believe they are separate cells with a function of their own than that nature in making acini had these cell nests left over. Possibly one might say the same of the islands of Langerhans. Obviously, the constancy of their occurrence is the first problem to be considered. These interstitial masses of cells are constant in early life. In most adult glands they are absent or sparse. What becomes of them in the adult state is wholly unknown. Whether they later acquire lumina and are indistinguishable from other acini, whether they atrophy and appear as flat, endothelial-like cells or whether they wholly disappear is not known. When one observes them in the adult, as seen in the type of disease I am now discussing, one cannot know if they have persisted from youth and have had a part in certain physical characters, or have returned to their previous form as a result of some stimulant, or are cells which have been derived from acinal cells.

The relation of the interstitial cells to the acinal cells is difficult to establish. An attempt to determine a cytologic difference has not been productive of satisfactory results. In the normal glands of children these differ but little from the cells lining the gland acini. The difficulty in distinguishing interacinal cell groups from tangential

sections of acinal walls is very great. In several of the figures to follow, what has been called interstitial cells have the appearance of oblique sections of acinal walls. However, one does not see such cell arrangements in normal glands. Reconstruction studies of such glands are urgently demanded. In many regions the existence of groups of cells independent of the acini cannot be doubted, however.

In typical cases of interstitial goiter the acinal cells are regularly deficient; often they are quite atrophic suggesting here a resemblance to the types of cells in the testis after the severance of the vas. The difference therefore, between the interstitial and acinal cells is more easily noted in the type of goiter now under discussion than in the normal glands of children. If we regard the interstitial cells as the



Fig. 1.—Normal thyroid from a boy four years of age. Between many of the acini are masses of cells quite independent of the acinal cells.

persistence of cells normal to the child we must assume an increase in their activity to account for the development of the thyroid manifestations, or that the disturbance of the acinal cells accounts for the dysfunctions.

In order to find a normal prototype for the interstitial type of goiter we must go back to childhood, somewhere before the fifth year. Here the interstitial cells are normally present in about the same proportion as that found in the average interstitial goiter. These interstitial cells are most numerous at the angles between the various acini (Fig. 1). It is to be noted that the cells lining the acini are cuboidal or columnar (Fig. 2). It is to be further noted that the interstitial cells are indistinguishable morphologically from the cells

lining the acini except perhaps for the amount and shape of the protoplasm. The nuclei are quite alike (Fig. 3).

Comparing the picture of the normal thyroid of childhood with clinically permanent types of interstitial thyrotoxicoses we see a similarity in some cases. This is most often observed in patients who present the characteristic nervous symptoms but a normal physique. In these cases the acinal cells are normal but the interstitial cells are increased, presenting the picture of the infantile gland. In the typical cases there is a marked increase of the interstitial cells, a quiescent state of the acinal cells and a colloid but little if at all changed (Fig. 4). In comparing the interstitial cells with those of the adjoining acini one sees them to be large with large ovoid, deeply staining



Fig. 2—Normal thyroid from a boy four years old. The acinal cells are cuboid or low columnar.

nuclei while the adjacent acinal cells are flat and the nuclei faintly staining (Fig. 5). The character of the acinal cells is better shown when examined in thin sections with an oil immersion lens (Fig. 6).

*Clinical Picture.*—In a series of goiter patients it is easy to select a group in which the symptoms of thyroid intoxication are mild and do not tend to increase. The thyroid is small, the pulse rate rarely exceeds 120 and the loss of weight is not great. The nervous symptoms are those of the neurasthenic rather than those due to an adenomatous thyrotoxicosis. That is, their complaints are voluble and vociferous but there is little in their action which indicates nervousness. This is in marked contrast to the toxic adenomas in which the patient complains but little, but thrashes about her bed in an excited manner.

Two types can be distinguished. In the first type the physique indicates maldevelopment. These patients are usually tall, thin, of delicate general constitution. They seldom play anything more strenuous than croquet and they do not break the late hour rule. They suffer from scant and painful menstruation. Then their thyroid begins to increase in size and they become more nervous. They sleep poorly and are troubled with palpitation of the heart. They lose a little weight, and that is all. They remain in this stage for months and years with no tendency to increase of their malady. After a time they improve, with operation or without, and they are again as they were in the beginning, lean and nervous.

The second is seen in well-developed girls and adolescents of normal constitution. They have pains at their menstruation, become nervous,

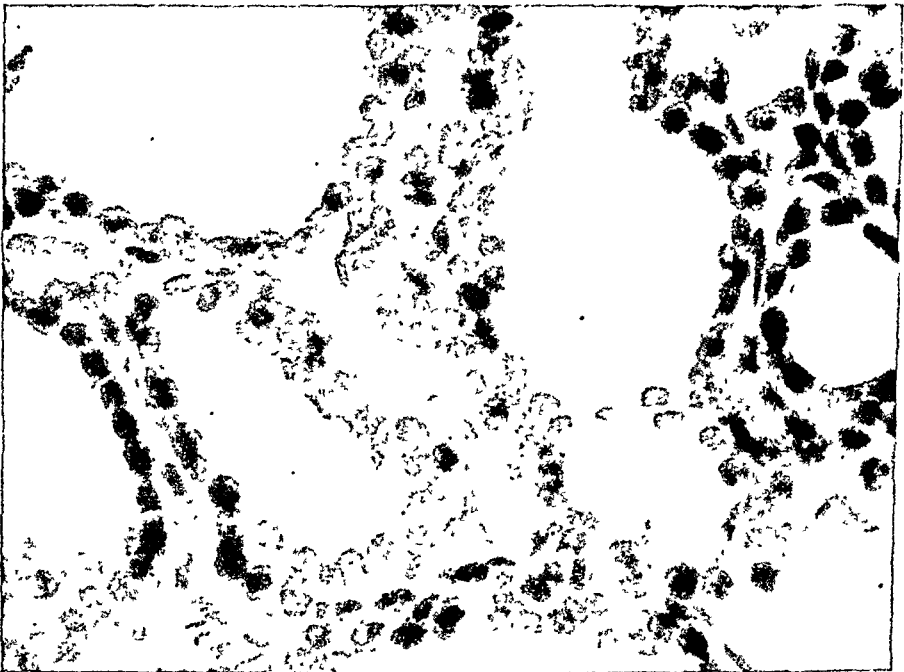


Fig. 3.—The acinar and interstitial cells appear quite alike in size and tinctorial reaction. (Specimen from a child four years old.)

the pulse increases to 110 or 120 and they lose a little weight. Some of these come because of menstrual disturbance and the goiter is found in the routine examination. Others come because of the goiter and one learns of the menstrual disturbance from the history. Others come because of the dysmenorrhea and the goiter is regarded as an innocent condition.

#### RELATION OF GOITER TO PELVIC DISEASE

In order to determine the coincidence of goiter and pelvic lesions I made notes regarding these points on 100 consecutive patients examined during the month of January, 1922. The attempt was made to limit the observation to those types of goiters above described, as

interstitial. Cases of adolescent, colloid, toxic adenoma, fetal adenomas, Graves' disease, etc., were excluded. All the patients enumerated below had small goiters and other symptoms characteristic of interstitial goiter noted above. Some came because of their goiter, some for nervousness, some tuberculosis and some because of pelvic disturbance.

*Normal.*—At the present time what shall be regarded as normal menstrual history is a relative thing. Married patients who had only moderate dragging or lower abdominal pain were regarded as normal. The unmarried if indisposed no more than a few hours were considered normal. If the pain was severe enough to require them to desist from their usual employment they were put down as abnormal. There



Fig. 4.—Slide from an interstitial goiter. The interstitial cells are numerous and the colloid but little changed. This patient was highly neurotic and was not improved by operation.

were 13 patients whose pelvic functions were accounted normal. Young girls sometimes do not admit menstrual pain, fearing such admission would lead to a pelvic examination.

*Dysmenorrhea.*—Married women who complain of pelvic pain, backache and headache as major symptoms and girls who were compelled to give up their work for a time were regarded as having dysmenorrhea. Of these there were 26. Of this number 9 were married and presented no gross pelvic lesions. Local tenderness was not regarded as pathologic. The 17 unmarried women were not subjected to pelvic examination and the anatomic state of their pelvic organs is not known. Their menstrual disorders were such as to interfere with their occupations for at least half a day at each menstrual period.

*Displacements.*—There were seven in this group. The displacements accompanied by occipital headache and general pelvic discomfort but without marked pain are included in this group. Several noted an increased nervousness and a sense of fullness in the throat at the time of the menstrual period. There is no relation between the probable beginning of the goiter and the displacement in so far as these can be determined.

*Dysmenorrhea with Displacement.*—There were ten in this group. These were all nonparous women who had in addition to displacement very marked discomfort in the married and disabling pain in the unmarried.

*Displacement and Cervical Laceration and Erosion.*—In this group were included those who had displaced uteri and laceration and erosion

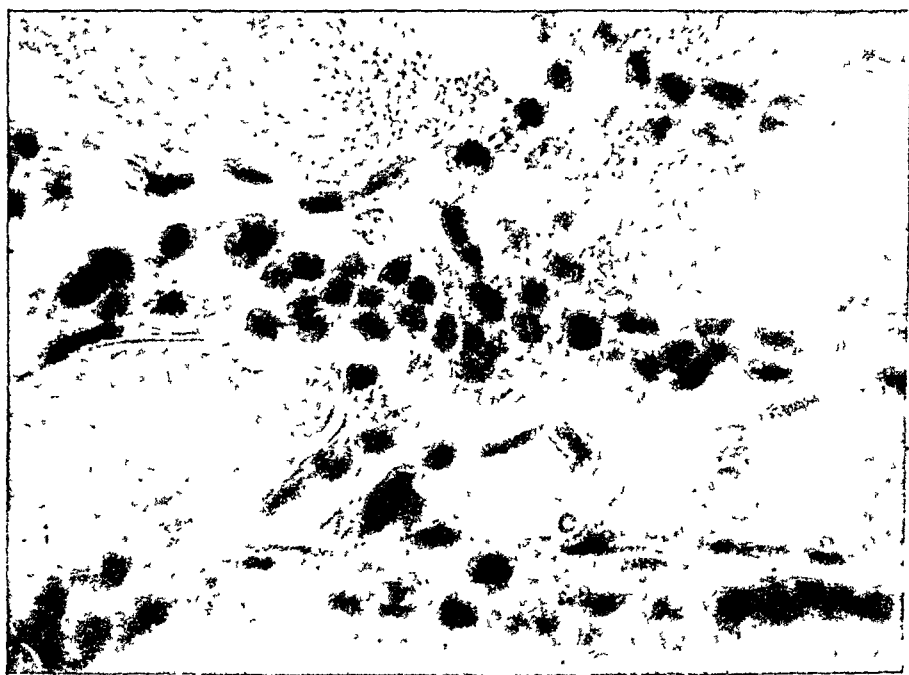


Fig. 5.—High power of Fig. 4. The interstitial cells are large and deeply staining while the acinar cells are flat and present no evidence of activity.

such as would call for repair had the patient no other lesion. All of these came as gynecologic patients. The enlargement of the thyroid gland was discovered in the course of the routine examination.

*Metrorrhagia.*—Four of the patients had excessive flooding such as required treatment. One had been treated with radium and was amenorrhagic with great increase of nervous symptoms. The remaining three had no discoverable cause for the excessive flow.

*Scanty Flow.*—Four of the patients noted progressive lessening of the menstrual flow and with the decrease of the flow came an increase of the pain. This is the type in which symptoms of thyrotoxicosis are attended by increase in weight. One of these patients gained 70 pounds in seven months, associated with increasing nervousness. One

patient had metrorrhagia with displacement. The presence of a myoma could not be excluded in this case.

*Myomas.*—Three patients had myomas of the uterus. One was not aware of any pelvic trouble and two had pelvic disturbance.

*Pelvic Operations.*—Eight patients had some sort of pelvic operation since the advent of their nervous state. Three had had curettements, three repairs of the cervix and perineum with some ligament operation, and one, a bilateral oophorectomy. None of these were operated upon in this clinic and the exact nature of the operation is not known nor was it possible to determine the state of their thyroid glands at the time of the operation. In but few of these patients was the goiter discovered before operation. The patients came because of some in-

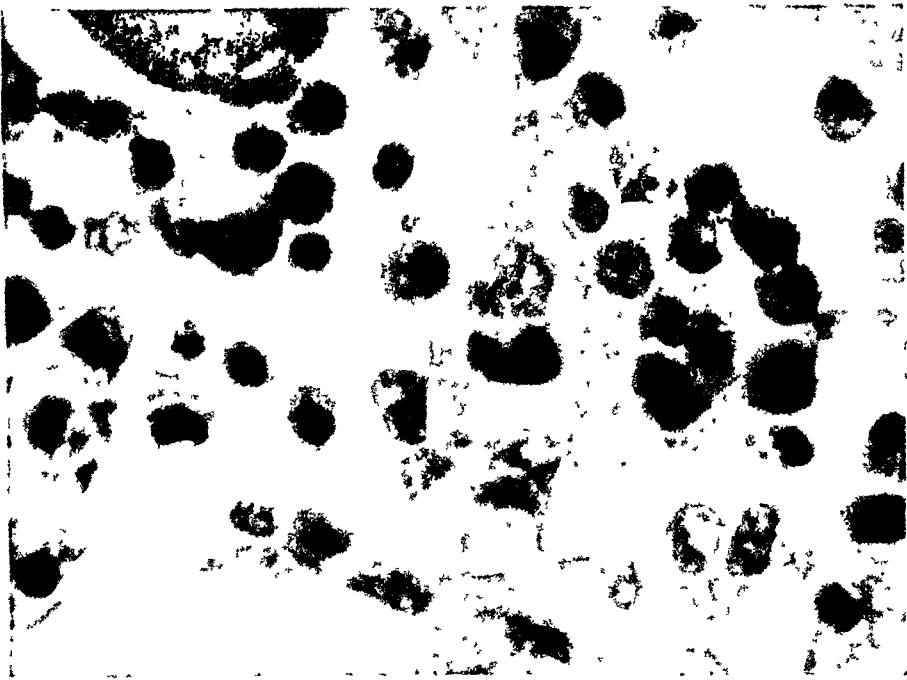


FIG. 6.—Interstitial cells, showing the large, deeply staining nuclei. (Oil immersion.)

definite symptom such as nervousness, palpitation, loss of weight or some menstrual disturbance.

*Chronic Pyosalpinx.*—Seven patients had fixed uteri in position or displaced. The cause of the fixation was not determined, but evidently due to some parauterine inflammation.

*Miscellaneous.*—One had undergone menopause at 35 years of age, one was in the menopause at 46 and one was in the seventh month of pregnancy. Each of these dated her nervousness after the cessation of her menstrual flow.

Of this series 13 were regarded as having normal menstruation. Twenty-six had dysmenorrhea without anatomic lesions. Therefore, approximately one-fourth of the cases come under the caption of this paper, goiter with dysmenorrhea. This small series was studied solely



to gain some idea of the proportion of this class of cases to all goiter patients.

These conclusions are corroborated by a compilation of recent statistics. Of 1081 patients treated for goiter in this clinic last year approximately 300 belonged to this group.

*Symptomatology and Diagnosis.*—The recognition of the symptom complex of goiter and dysmenorrhea requires a certain degree of care. In a goiterous country such as this, where death from acute thyrotoxicosis is common, patients are on the lookout for enlargement of the thyroid gland. When such an enlargement occurs medical advice is usually sought.

*Goiter.*—The first factor to be determined is whether or not there is an enlargement of the thyroid gland. This is not always easy. The normal thyroid gland in young women is palpable as a soft mass the size of the last joint of the thumb just above the clavicle. In patients with long necks it is higher. A diseased gland is characterized more by its increased consistency than by its increase in size. Therefore, a gland of normal size which is hard must be regarded as having undergone some anatomic change. In most instances this change is associated with an increase in size. The change in consistency is the chief differential factor between this type of goiter and the small colloid goiters so common in young persons.

*Pulse Rate.*—When a possible change in the size of the thyroid gland is in doubt the pulse rate often helps. If there are definite changes in the thyroid gland the pulse rate is usually augmented to between 90 and 120. A slow pulse even to 60 or less is occasionally found. In addition to the increase in rate the pulse is full, sometimes bounding. The apex beat is heaving and the area widened.

*Loss of Weight.*—A slight loss of weight is common. This usually varies between 10 and 20 pounds. Sometimes there is an actual increase in weight. This is sometimes pronounced, even so much as 90 pounds in six months.

*Nervousness.*—Nervousness is a common accompaniment. This is usually subjective and amounts to wakefulness and inability to concentrate the mind or perform any work satisfactorily, though it seldom completely incapacitates the patient.

*Dysmenorrhea.*—When the pelvic disturbance dominates the picture the patient usually comes complaining of premenstrual or menstrual pain, irregularity in time and amount of flow or less commonly of leucorrhœal discharges. On the other hand an equal number come because of right-sided groin pains. Unless the appendix has already been removed these usually come with a diagnosis of chronic appendicitis. The error of this is obvious from the fact that there is no such disease as chronic appendicitis and also by the fact that these

pains usually radiate to the iliac crest, the hip or down the thigh, thus disclosing the ovarian origin.

Whichever symptom group the patient presents as her chief complaint the other must be diligently investigated. Thus, if a goiter is obviously present the menstrual history is carefully inquired into. History is usually sufficient. Physical examination need be resorted to only if the patient has already been subjected to pelvic examination and some abnormality is alleged to have been found. In such cases an examination is necessary that the practitioner can properly refute the argument for an operation which usually has already been presented to the patient.

If the patient comes because of menstrual trouble the search for goiter must be made following the outline already indicated.

When both symptom groups are present the diagnosis is not yet assured. Other conditions must be sought for, notably tuberculosis. All the aids, including the x-ray, must be employed. In some instances the patient must be observed for a time before a differential diagnosis can be made. If the patient's physical vigor promptly increases with the exhibition of bromides she most likely does not have tuberculosis. Of equal importance is the history of the patient before the advent of the disease complained of. Undernourished girls of poor heredity have dysmenorrhea as a part of their normal heredity and it can hardly be classed under the category of disease. The same applies to their nervousness and chronic weariness. One cannot cure a patient of what they had before they got sick. One deals here with biologic classification and not with the diagnosis of disease.

#### TREATMENT

Patients are all subjected to a general examination. If there is an anemia this is looked after as is any other contributing factor. Whether or not the patient comes complaining of goiter, pelvic pains or dysmenorrhea, the thyroid element is stressed. The patient is assured that this is the important thing and that it is of a type which does not require operation but is always cured by medication; that the pelvic symptoms are secondary and will disappear as the goiter improves. If they have had a diagnosis of appendicitis elsewhere this is explained as ovarian pain. If the appendix had been removed or the ovaries tampered with, especial care is taken not to leave the impression that the operation was useless but that happily all the surgery required has been done.

If the patient is very nervous and has lost more than ten pounds in weight she is first given hyoscine (or belladonna) and bromides until the nervousness subsides. Then potassium iodide is added in a grain or two doses one to three times a day. The medicine is given two or three times a day until the weight improves and the pulse becomes

80 or less, then the medicine is continued once a day until the thyroid gland becomes normal.

If after from three to six months the dysmenorrhea is not improved, examination is suggested to be made under ether, or sooner if the patient becomes impatient of results. It was my former practice to correct surgically any displacement found but unless there is evidence of periuterine adhesions this is no longer done. The displacement is a coincident factor and not a cause of the dysmenorrhea. The mythical atresia of the os, the anterior displacements, etc., have of course been outgrown years ago. I confess also to have done resections for "cystic" ovaries but I am proud to state have never done an oophorectomy, thanks to the vehement condemnations of that procedure by my distinguished teacher, Olshausen.

In young patients who are underdeveloped, I believe the use of anterior lobe of pituitary gland, five or ten grains a day, aids materially in hastening the recovery.

The theory of the use of the pituitary extract is that this portion of the gland has to do with the development of the genital function. If this be true then the conclusion would be warranted that a hypofunction is the fundamental factor.

Usually from six to eighteen months are required to complete a cure. Often when treatment is discontinued the dysmenorrhea returns even without the obvious retard of the goiter. Sometimes the dysmenorrhea disappears for some months and returns even while the treatment is being continued. Often indiscretions in hygiene or conduct are the cause.

Failure to respond to treatment may be due to anatomic changes in the pelvis, often some hereditary factor or to changes in the thyroid gland which do not respond to medical treatment. In the latter case operation may be resorted to. Operation will not cure a condition which was present before the advent of the goiter. As a general thing, operation should be avoided even though the patient does not get well on medical treatment.

*Discussion.*—That the surgical treatment of dysmenorrhea is wholly unsatisfactory most surgeons know from experience. The abundant literature shows that this experience is universal. This in itself should suggest that the attack is along the wrong front. That dysmenorrhea is commonly relieved by pregnancy was well recognized by the old family doctor. That pregnancy has a far greater effect on the endocrine system than on the anatomy of the pelvic organs is now, in the light of our knowledge of endocrine physiology, perfectly obvious. That the thyroid gland concerns itself with the vicissitudes of the reproductive function likewise is well established. Just what this functional relation is cannot be stated. The clinical experience herein recorded presents another clue to this relationship. It is interesting

to note that some of the prescriptions used for dysmenorrhea half a century ago contained potassium iodide. Pure empiricism, however, has given way to at least a semblance of scientific investigation.

#### CONCLUSIONS

1. Many young women present small goiters associated with mild degrees of thyrotoxicosis.

2. Anatomically these glands show changes in the colloid, inactive acinal epithelium and apparently an increase in the cells situated between the acini.

3. Many of these patients have an associated dysmenorrhea without demonstrable anatomic changes in the pelvic organs.

4. When these patients are treated in the conventional manner for their goiters, the dysmenorrhea disappears in the vast proportion of cases.

5. This applies as well to the common groin pains so commonly diagnosed chronic appendicitis, for the relief of which appendectomy is wholly impotent.

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### A STUDY OF STREPTOCOCCI FROM CHRONIC INFECTION OF THE CERVIX UTERI AND FALLOPIAN TUBES

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THE investigations of the causative organisms in infections of the cervix and fallopian tubes have gone little beyond a study of their incidence. The type of infection considered is of a chronic character, by which we mean those clinical conditions extending over long periods of time with recurrent acute exacerbations. When a patient enters the clinic of Dr. Barrett at Cook County Hospital with an acute exacerbation, she must become temperature-free and leucocytosis-free before she is considered ready for operation. It was the desire to know the predominating organism of these infections which stimulated this study.

According to A. Martin,<sup>1</sup> in 2,078 cases of purulent salpingitis, 279 were gonorrheal, 374 puerperal septic infection, 19 tuberculous, 13 luetic. From the statistics of Martin, Schauta, Fromme, Charrier, Wertheim and Prochownik,<sup>2</sup> 376 cases were collected, and of this number 76 showed pure culture of gonococci, 10 a mixed gonorrheal infection, 15 staphylococcus and streptococcus, 7 pneumococcus, and 3 B. coli. In 15, there was doubtful identity and 215 tubes were sterile.

Menga,<sup>3</sup> in 122 cases of purulent salpingitis, found organisms in 47

and none in 75. Of 44 pure cultures, 28 were gonococci, 9 tubercle bacilli, 1 staphylococcus, 1 *B. coli*, and 1 anaerobic diplococcus; while in 3, mixed cultures were obtained.

A. H. Curtis<sup>3</sup> investigated the fallopian tubes of 300 patients, 192 of which were studied bacteriologically and pathologically. He placed the tissue in sterile towels upon removal from the abdomen, later ground it up and inoculated meat infusion, ascitic and blood agar. He divided his cases into three groups, first: those with gross active inflammation, 64 cases, of which 29 had no growth, 19 were gonorrheal, 2 gave non-hemolytic streptococci, 2 hemolytic streptococci, 5 anaerobic streptococci, 3 *B. coli*, 3 mixed growth, and 1 *B. proteus*. Second: those with microscopic evidence of active inflammation which numbered 38, 27 of which showed no growth, 4 gave nonhemolytic streptococci, 1 hemolytic streptococci, and 6 tuberculosis. Third: those having no evidence of inflammation and showed no organisms on culture. He mentions that injection of hemolytic streptococci intravenously into a rabbit produced purulent arthritis and acute nephritis.

In his work on the bacteriology of leucorrhea, in which only vaginal discharges were studied, Curtis<sup>4</sup> found that the organisms isolated were nontoxic to animals. He described an anaerobic streptococcus, hemolytic aerobic streptococcus, and a nonhemolytic aerobic streptococcus, the incidence and pathogenicity of which were not discussed.

The material for our study was obtained from the women on the gynecologic service of Drs. Barrett, Culbertson, and Fischmann at the Cook County Hospital, Chicago. The cervical cultures, using ascitic broth, were taken before operation through a vaginal speculum under direct vision with a sterile wire loop. Direct smears were also made and examined. At the end of twenty-four hours, these cultures were studied in smears; subcultures were also made and studied after twenty-four hours' incubation at 37.5° C. aerobically.

The fallopian tubes were put into sterile Mason jars upon removal and examined within fifteen minutes, as a rule. Under sterile precautions a section of the tube was excised for microscopic study and a smear made of the exudate covering the endosalpinx. The tube was cut into small sections, subdivided with sterile scissors and then dropped into a large test tube containing ascitic broth. Twenty-four hours later, a smear was made together with subcultures on ascitic agar, blood agar, and endoplates. The streptococci were isolated in pure culture, and their cultural properties studied in milk and carbohydrate broth. All cultures were cultivated aerobically.

The direct smears and those from cultures were all stained by Gram's method. The media used were: Ascitic broth, which consisted of beef infusion, using sodium dibasic phosphate instead of NaCl P<sub>H</sub> 7.3 (corrected with sodium carbonate), 1 per cent peptone, and ascitic fluid added in the proportion of one part of fluid to four of broth; ascitic agar plates which had the same composition as the ascitic broth plus 1.5 per cent agar; blood agar which consisted of beef infusion, 1 per cent peptone, 2 per cent agar-agar, sodium chloride, adjusted to P<sub>H</sub> 7.8 (corrected with sodium hydroxide), 5 per cent defibrinated sheep blood;

endoplates made in the usual way; sugar broth was made of beef infusion broth, 1 per cent of the sugar (lactose, salicin, mannite and inulin) with Andrade's indicator (1 c.c. to 100 c.c. medium) and sterilized by the intermittent method.

Smears of the streptococci revealed Gram-positive cocci in chains of varying lengths. The viridans type often appeared as lance-shaped diplococci, thereby simulating pneumococci from which they were differentiated by the bile solubility test.

In ascites broth the hemolytic streptococci produced a flaky sediment with a flocculent suspension which settled on the bottom and sides of the tube, but the supernatant fluid remained clear. The viridans type produced a granular or loose, fluffy suspension. On carbohydrate broth a sediment usually formed.

On blood-agar plates, the hemolytic forms produce small, discrete, biconvex, colonies surrounded by a clear zone of hemolysis measuring 2 to 4 mm. across. The *Streptococcus viridans* colonies produce a green discoloration. Those colonies having a narrow zone of hemolysis surrounding the green zone were classified as the alpha type of the hemolytic streptococci according to Smith and Brown.

The bacteriologic results of examinations of fallopian tubes from 100 patients and of 40 cervical cultures from the same patients are given in Tables I and II.

TABLE I

SOURCE OF STRAINS	NUMBER OF PATIENTS	NUMBER OF CASES GIVING NO GROWTH	STREPTOCOCCI		
			HEMO-LYTIC	VI-RIDANS	INDIF-FERENT
Fallopian tubes with gross changes	100	20	14	21	3
Cervix of same patients	40	7	2	11	3

TABLE II  
ASSOCIATED ORGANISMS

	SOURCE OF STRAINS	
	FALLOPIAN TUBES FROM 100 PATIENTS	CERVIX IN 40 OF THE 100 PATIENTS
<i>Gonococcus</i>	4	3 - 1 (?)
<i>B. coli</i>	13	9
<i>Staphylococcus</i>	33	6
<i>Micrococcus tetragenus</i>	1	0
<i>B. diphtheroids</i>	3	5
<i>B. proteus</i>	3	2
<i>B. capsulatus</i>	4	0
<i>Pneumococcus</i>	2	0
<i>Spirilla</i>	0	2 on smear
Gram-positive diplococcus	0	6

*Streptococcus hemolyticus* was found in 14 instances (of 100 cultures), or 14 per cent; *Streptococcus viridans* in 21 instances, or 21 per cent; and *Streptococcus indifferens* in 3 instances, or 3 per cent. *Streptococcus hemolyticus* occurred in 2 of the 40 cervical cultures, or 5 per cent; while *Streptococcus viridans* appeared in 11 instances, or 28 per cent.

In two instances, *Streptococcus viridans* in the cervix was found associated with *Streptococcus viridans* in the tubes; and in two others, *Streptococcus hemolyticus* in the cervix were associated with *Streptococcus viridans* in the tubes.

The association of streptococci with other organisms was found as follows in the tubes: In 8 cultures, *S. hemolyticus* appeared alone; in 1 culture, *S. hemolyticus* with *S. viridans*; in 3 cultures, *S. hemolyticus* with staphylococci; in

TABLE III

S. HEMOLYTICUS	CARBOHYDRATE-FERMENTATION TESTS				HOLMAN CLASSI- FICATION <sup>5</sup>
	LACTOSE	SALICIN	MANNITE	INULIN	
4	+	+	0	0	S. pyogenes
9	+	+	0	0	S. pyogenes
10*	+	+	0	+	
11	0	0	0	0	S. subacidus
13	+	+	0	0	S. pyogenes
14	+	+	0	0	S. pyogenes
16	+	+	0	0	S. pyogenes
18	+	+	0	0	S. pyogenes
21	+	+	0	0	S. pyogenes
22	+	+	0	0	S. pyogenes
23	+	+	0	0	S. pyogenes
27	+	+	0	0	S. pyogenes
29	+	+	0	0	S. pyogenes
Indifferent Strains					
19	+	+	0	0	
Cervices					
2	+	+	0	0	S. pyogenes
3	+	+	0	0	S. pyogenes
6	+	+	+	0	S. infrequens
10*	+	0	0	0	S. anginosus

\*Repeated.

TABLE IV

S. VIRIDANS TUBES	CARBOHYDRATE-FERMENTATION TESTS				HOLMAN CLASSI- FICATION <sup>5</sup>
	LACTOSE	SALICIN	MANNITE	INULIN	
1	+	0	0	0	S. salivarius
3	+	+	0	0	S. mitis
6*	+	0	0	0	S. salivarius
8	0	0	0	0	
9	+	+	0	0	S. mitis
12	+	0	0	0	S. salivarius
15*	+	0	0	+	
17	+	+	0	0	S. mitis
20	+	+	0	0	S. mitis
25	+	+	0	+	S. mitis
26	+	+	+	0	S. fecalis
28	+	+	0	0	S. mitis
30	+	+	0	0	S. mitis
31	+	+	0	0	S. mitis
32	+	+	0	0	S. mitis
33	+	+	0	0	S. mitis
34	+	+	0	0	S. mitis
Cervices					
1	+	+	0	0	S. mitis
4	+	+	0	0	S. mitis
5	+	+	+	0	S. fecalis
7	+	+	0	0	S. mitis
8	+	+	0	0	S. mitis
9	+	+	+	0	S. fecalis

\*Repeated.

1 culture, *S. hemolyticus* with *B. coli*; in 1 culture, *S. hemolyticus* with *B. capsulatus*; in 1 culture, *S. hemolyticus* with gonococci; in 10 cultures, *S. viridans* alone; in 1 culture, *S. viridans* with *S. hemolyticus*; in 1 culture, *S. viridans* with gonococci; in 1 culture, *S. viridans* with staphylococci; in 2 cultures, *S. viridans* with *B. coli*; in 1 culture, *S. viridans* with diphtheroid bacillus in the cervix; in 1 culture, *S. hemolyticus* alone; in 1 culture, *S. hemolyticus* with *B. coli* and

tions of the fallopian tubes may be carried in through the vagina or may come from the throat or intestinal tracts. It would seem that these infections rarely result from streptococci normally present in the vaginal or intestinal tract. Considering their relative frequency, the throat may be an important source. It is quite possible that many of these infections, particularly those due to hemolytic streptococci, are exogenous from the vaginal tract or even from the throat.

This investigation brings forth such problems as; source of the streptococci, are they primary or secondary invaders; can chronic streptococcus infections of the cervix or fallopian tubes act as foci of infection as those in the tonsils? The bacteriologic findings are to be correlated with the pathologic and clinical findings and the conclusions will be presented at a later date.

#### SUMMARY

1. Streptococci are frequent in chronic infections of the cervix (40 per cent) and of the fallopian tubes (35 per cent). *Streptococcus hemolyticus* occurred in 14 per cent of the cultures of the fallopian tubes and 5 per cent of the cultures from the cervix, while *Streptococcus viridans* occurred in 21 per cent of the cultures of the fallopian tubes and 27.5 per cent of the cultures from the cervix.

2. There appears to be no relation between the incidence of streptococci in the cervix and that in the fallopian tubes.

3. The morphologic and cultural characteristics of the streptococci isolated from the diseased cervix and fallopian tubes resemble those isolated from abscesses, peritonitis, and fatal streptococcus infections.

4. The pathogenicity of the different strains of streptococci as determined by rabbit inoculations is similar to the strains isolated from various streptococcus infections. No specificity for the fallopian tubes was demonstrated.

An acknowledgment is made of the kindness of H. A. Singer, Pathologist, and Miss Kaplan, Bacteriologist of Cook County Hospital, for laboratory privileges and equipment.

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- <sup>1</sup>Martin, A.: *Handbuch der Krankheiten der Weiblichen Adnexorgane*, 1895, i, 169.
- Prochowick: *Ibid.*
- <sup>2</sup>Menge and Krönig: *Bakteriologie des Weiblichen Genitalkanals*, 1897, i.
- <sup>3</sup>Curtis, A. H.: *Surg., Gynec. and Obst.*, 1921, xxxiii, 621.
- <sup>4</sup>*Ibid.*: *Surg., Gynec. and Obst.*, 1914, xviii, 299.
- <sup>5</sup>Holman: *Jour. Med. Res.*, 1916, xxxiv, 377.
- <sup>6</sup>Moench: *Jour. Lab. and Clin. Med.*, 1924, ix, 289.
- <sup>7</sup>Burekhardt: Quoted from Kanter and Pilot.
- <sup>8</sup>Stolz: *Ibid.*
- <sup>9</sup>Kanter and Pilot: *Surg., Gynec. and Obst.*, 1924, vii, 96.
- <sup>10</sup>Pilot and Brams: *Jour. Infect. Dis.*, 1923, xxxii, 172.
- <sup>11</sup>Pilot and Davis: *Jour. Infect. Dis.*, 1919, xxiv, 386.
- <sup>12</sup>Holman: *Jour. Am. Med. Assn.*, 1919, lxxii, 319.
- <sup>13</sup>Oppenheim: *Jour. Med. Res.*, 1916, xxxiv, 377.
- <sup>14</sup>Broadhurst: *Jour. Infect. Dis.*, 1920, xxvi, 117.
- <sup>15</sup>Davis: *Jour. Am. Med. Assn.*, 1919, lxxii, 323.
- <sup>16</sup>Kraft: *Jour. Infect. Dis.*, 1921, xxviii, 122.



RABBIT 38.—The sediment from 25 c.c. of a forty-eight hour ascitic-broth culture of *Streptococcus hemolyticus* of the alpha type isolated from the fallopian tubes of patient No. 30 suspended in sterile normal saline solution were injected intravenously. The rabbit was found dead on the ninth day after inoculation. The autopsy findings were suppurative arthritis of the right knee, right shoulder and right wrist, and vegetative endocarditis of the mitral leaflets. The cultures from the heart's blood and from the exudate of the joints yielded streptococcus.

Forty-one rabbits were so injected, one of which died of pneumonia. Four died in one to eight days giving positive blood cultures, having received *Streptococcus hemolyticus* B. strains, and purulent arthritis of several joints, including intervertebral joints, hemorrhages into the muscles, purulent tenosynovitis, hemorrhages into the endocardium except in the one dying in twenty-four hours, in which case, however, *Streptococcus hemolyticus* was isolated from the heart's blood and serous fluid of the joints and a second only positive blood culture. In three rabbits receiving *Streptococcus hemolyticus* B. (being killed in ten to twelve days) developed purulent arthritis and yielded positive cultures from heart's blood in one case and from the joints in two cases. One killed at the end of thirteen days showed no findings. Of the 23 strains of *Streptococcus viridans* tested, 12 developed arthritis involving the various joints from which only 6 positive cultures were obtained and only 3 positive heart's blood cultures. It is interesting to note that the *Streptococcus viridans* strains were usually less virulent than the *Streptococcus hemolyticus* except the strain of *Streptococcus viridans* which was combined with *Streptococcus hemolyticus* strain. It produced marked seropurulent polyarthritis; from the joints *Streptococcus viridans* was isolated. From the 7 strains of *Streptococcus hemolyticus* of the alpha type, purulent arthritis and tenosynovitis occurred; but in 5 instances giving positive cultures in 3 and positive cultures from the heart's blood in 4 instances. Strain 30, one of the hemolytic alpha types produced a vegetative endocarditis of the mitral leaflets, embolic abscess of left kidney and suppurative arthritis of right knee, wrist and shoulder. From the joint exudate and heart's blood, streptococcus was isolated. The indifferent streptococcus produced an arthritis of one wrist and left hip, but the culture from the heart's blood was negative.

The strains of streptococci isolated, produced arthritic lesions although the patients had no arthritis. These findings are contrary to those of Moench<sup>6</sup> who found the strains of streptococci isolated from leucorrhœal discharges of patients with arthritis, produced a greater percentage of arthritis in rabbits than those isolated from patients without arthritis. The fallopian tubes of our rabbits injected, revealed no gross or microscopic pathology.

As to the probable source of the streptococci, one may consider the normal distribution. Streptococci have been found in the vaginal secretions in varying percentages from 4 per cent of cases by Burekhardt<sup>7</sup> to 30 per cent of cases by Stolz.<sup>8</sup> Kanter and Pilot<sup>9</sup> found only 3 per cent *Streptococcus hemolyticus* and 56 per cent other types of streptococci in the vagina of pregnant women. Pilot and Brams<sup>10</sup> isolated hemolytic streptococci in the preputial secretions of 9 of 100 normal men. Pilot and Davis<sup>11</sup> recovered hemolytic streptococci in 58 per cent of the throats of individuals (twenty to thirty years of age) with normal tonsils, while the nonhemolytic type was present in almost 100 per cent of the tonsils. From the crypts of the hyperplastic tonsils the hemolytic streptococci were found in 98 per cent. Holman,<sup>12</sup> Oppenheim<sup>13</sup> and Broadhurst<sup>14</sup> showed that streptococci are not common in the feces. Davis<sup>15</sup> fed hemolytic streptococci to rabbits every day for a month and only occasionally recovered them in the stools. Kraft<sup>16</sup> found hemolytic streptococci in 2 instances of 48 normal appendices and in 4 of 77 pathologic ones. Therefore, primary or secondary infec-

tions of the fallopian tubes may be carried in through the vagina or may come from the throat or intestinal tracts. It would seem that these infections rarely result from streptococci normally present in the vaginal or intestinal tract. Considering their relative frequency, the throat may be an important source. It is quite possible that many of these infections, particularly those due to hemolytic streptococci, are exogenous from the vaginal tract or even from the throat.

This investigation brings forth such problems as; source of the streptococci, are they primary or secondary invaders; can chronic streptococcus infections of the cervix or fallopian tubes act as foci of infection as those in the tonsils? The bacteriologic findings are to be correlated with the pathologic and clinical findings and the conclusions will be presented at a later date.

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- 17Kraft: *Jour. Infect. Dis.*, 1921, xxviii, 122.

## INDICATIONS FOR, AND THE END-RESULTS OF, THE STURMDORF OPERATION\*

BY W. A. COVENTRY, M.D., F.A.C.S., DULUTH, MINNESOTA

*(From the Duluth Clinic)*

THIS report and opinions are based upon a series of seventy-five cases operated by me in which the Sturmdorf method of amputating the cervix was followed.

There are certain definite indications in which operative procedures are necessary upon the cervix, and some certain definite conditions in which I believe operation is absolutely unnecessary. I shall attempt to enumerate these as they appeal to me:

1. It must be understood that all cases of irritation about the cervix, in which there is a slight increase in discharge, and in which there is some slight reddening or possibly slight proliferation of the epithelium onto the vaginal portion of the cervix, do not require such radical procedure as surgical intervention. I have found that practically all of these cases will respond very promptly to treatment, instituted along the line of cleaning out the discharge as well as possible by the use of some alkali, such as sodium bicarbonate or liquor potassium solution, and then painting the surface with silver nitrate. Some of these cases may even go on to a more or less polypoid condition of the cervix and with these I have been able to obtain exceptionally satisfactory results by the use of an electric nasal cautery, using more or less lineal incision into the cervix over this eroded area.

2. The second class of cases, in which I do not believe it is necessary to use such radical measures, is that in which there seems to be not much, if any, ulceration about the cervix but in which there is a profuse discharge. Very often this is tenacious. Sometimes, however, only a clear plug of mucus comes from the cervix, still very tenacious, with definite infection of cervical glands, without hypertrophy or hyperplasia. This can be cured by nonoperative measures, by the use of alkaline swabs, douches, suction by Bier's hyperemia, and applications to the cervix using a silver nitrate solution or 5 per cent mercurochrome solution.

3. The next type of case that one encounters is that in which there has been a previous slight tear of the cervix, usually of the bilateral type, in which there is moderate ectropion present, i.e., turning out of the cervix, with some increase in discharge, and occasionally some slight erosion. All of these cases I have been able to treat and obtain most

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\*Admission Thesis to American Association of Obstetricians, Gynecologists and Abdominal Surgeons.

satisfactory results by the use of a deep linear cautery incision, which causes some sloughing and then heals in with a clear scar, leaving a cervix which does not appear to be exactly normal in contour but which is free from discharge.

4. Recent lacerations, where acute infection and inflammation of the perimetrium occur, are better treated medically for a considerable period before considering operation.

5. I have seen Sturmdorf operations performed on young unmarried girls, where it was necessary to do an episiotomy as a preliminary step. I do not believe this is ever warranted and operation had better not be performed.

6. We have never considered sterility a sufficient cause for operation.

However, in my hands, I have found that the Sturmdorf operation is one which is indicated and best suited in cases of rather marked stellate laceration in which there is marked hypertrophy and scar formation in the cervix, many times the cervix being even larger than the uterus itself.

The second type have been those in which there has been a marked bilateral tear, with marked turning out of the interior of the cervix into the vaginal vault, accompanied by much scirrhus thickening of the cervical tissue.

The third class of cases in which a Sturmdorff, in my opinion, is indicated is that in which there are marked retention cysts in the cervix that have been treated by aspiration, etc., without any results; also in which the cysts have been punctured, either by the knife or else by the actual cautery, and satisfactory results have not been obtained. These cases have been cured by the use of the Sturmdorf operation.

The fourth class is that in which erosions are rather extensive, extending well down onto both lips, in which the economic interest of the patient must be considered because the patient lives out of the city and it is impossible to carry on proper treatment. These cases, in my opinion, had better be operated, this giving the quickest and surest results.

The fifth class of cases is that in which there is chronic infection which has persisted for years, the cervix being the focal point. However, this should have preliminary treatment, but usually the results from office treatment are not satisfactory and operation is finally indicated.

The childbearing age incidence need have no bearing except as previously noted.

Where a salpingitis complicates the condition of the cervix, do not operate the cervix without doing the necessary procedure on the fallopian tubes at the same time.

The sixth class of cases is that in which there is marked subinvolution of the uterus, accompanied by a hypertrophy and hyperplasia of the cervix. In these cases, removal of the gland-bearing tissue gives very

excellent results, as it brings down the subinvolution of the uterus, at the same time freeing the perimetrium so that the uterus becomes more movable.

In the beginning we attempted to follow Sturmdorf's original method as outlined in his article appearing in *Surgery, Gynecology and Obstetrics* in 1916, until we found that there were several things upon which we thought we could improve.

1. The use of silkworm-gut in the cervix. In the use of the silkworm-gut we had several difficulties:

(a) The fact that many of the patients lived out of the city made it rather difficult at times to have them return for the proper removal of the stitches.

(b) Occasionally a stitch was missed at the time of removal, and this was very disagreeable because it was usually found by a doctor in a neighboring city.



Fig. 1.

This led to the use of chromic catgut stitches, using them double strength. Since using this stitch we have had no trouble whatsoever as far as the catgut giving away or nonhealing of the wound. All wounds have healed by primary intention, with very satisfactory results. The patients have a slight increase in discharge until all the knots have sloughed away or have disintegrated and come away in the vaginal douches.

2. The second thing we have found is that by the use of the bullet tenaculum forceps it is rather difficult at times to pull down the uterus and insert the stitches as easily as one would like; so the cross section instrument which is here illustrated was devised (Fig. 1), and since using this type of instrument the operation has been very much easier to do, the surfaces much more easily brought into view, and sutured more readily.

3. The third lesson learned was that in regard to hemorrhages. There have been two cases in this series in which there was a postoperative

hemorrhage. In both cases hemorrhage was not severe, but at least caused some slight apprehension, making us think that we would have to reoperate. One of these occurred when silkworm-gut was used, and the other occurred with chromic catgut. The trouble probably came from the fact that one of the descending branches of the cervical artery was not observed at the time of operation, when it should have been ligated.

4. The fourth complication that arose was the possibility of atresia of the cervix following operation. We have had two cases of this type, and both of them occurred in cases which were undoubtedly operated before the infected cervix had been properly treated preoperatively. Since then we have all cervixes that are essentially infected or are acutely infected, taken care of by preoperative treatment with boroglycerid tampons, the application of silver, and hot douches, until the inflammatory reaction subsides; then operation seems to be perfectly safe. The question of applying a strip of sterile gauze to the interior of the cervix has not been found necessary at any time.

5. Microscopic slides made from the removed cervical area show that the racemose glands extend only about two-thirds of the length of the cervical canal. Thus, one does not have to encroach upon the internal os as far as was at first supposed, this simplifying the operation and removing some danger of possible subsequent abortion.

#### END-RESULTS

For many years, I had used the Emmet operation or some modification of it, for repair of the cervix, but since using the method devised by Sturmdorf, I am frank to confess that the final results have been most satisfactory.

*Future Pregnancy.*—Most of these cases that were operated upon were beyond the age of probable pregnancy. However, there were two cases which subsequently became pregnant and went into labor. They gave no trouble whatsoever, unless it was that the first stage was somewhat delayed, but in neither of these cases was there any further evidence of dystocia nor any bad results after delivery. On final examination the uterus and cervix had contracted down to where they were before the patient became pregnant.

In only one case has there been an abortion as a result of the cervical scar. This case, however, was not one of our own, but one that was observed following an operation by another surgeon, in which I feel very positive that too large an area of cervical tissue was removed.

*Discharge.*—Two cases have not been satisfactory as far as the discharge is concerned, although all of the cervical tissue seems to have been removed. One of these cases later developed a salpingitis, making me think, in spite of the many theories that have been advanced about

infection from the uterus, that the discharge comes from the body of the uterus itself. The other case we are unable to explain. The discharge is about as profuse as before, in spite of all subsequent treatment that has been given to this patient.

Another feature that stands out prominently in my mind as an end-result of the Sturmdorf method is the enucleation and eradication of all the gland bearing area in the cervix, producing a state of affairs in which the possibility of carcinoma developing in the cervix uteri can be practically eliminated.

With these few points on the indications for the operation to be performed, on some slight refinement in technic which appeals to us, and on the final end-results, we feel very well satisfied that the Sturmdorf method of operating upon cervixes of the kind mentioned, is by far more satisfactory than other methods, both from the standpoint of the cure obtained and from the standpoint of subsequent pregnancies and labors.

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## CLINICAL SIMILARITY BETWEEN ECLAMPTIC TOXEMIA AND ACUTE GLOMERULONEPHRITIS\*

BY ROBERT D. MUSSEY, M.D., ROCHESTER, MINNESOTA

*(From the Section on Obstetrics, Mayo Clinic)*

ATTENTION has been called by Keith and Volhard to the similarity of the symptoms of trench or war nephritis to certain phases of the toxemia of the later months of pregnancy. The predominant pathologic lesion of war nephritis was described by Dunn and McNee, Keith and Thomson, MacLean and others as an acute glomerulonephritis. Abercrombie in his "Observations on the Acute Phase of Five Hundred Cases of War Nephritis" describes the symptoms as follows: "The color is often good, and may be ruddy. The onset is gradual, with headache, swelling of the face and shortness of breath, although occasionally there may be a rapid onset. Hypertension is almost invariably present, and albumin with either gross or macroscopic blood in the urine." This is strikingly similar to Kosmak's description of preeclamptic toxemia which is substantially as follows: headache, malaise, moderately high blood pressure and more or less edema of the extremities; in more severe cases, epigastric pain, persistent headaches and visual disturbances. There is a reduction in the amount of urine, which contains albumin, casts and sometimes red blood cells.

A universally acceptable classification of the toxemias of late pregnancy has not as yet been evolved. Williams divides them into the

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\*Submitted for Membership in the American Association of Obstetricians, Gynecologists and Abdominal Surgeons.

nephritic and the eclamptic types: the former associated with both acute and chronic primary disease of the kidney; the latter, a separate entity whose only absolute feature is the presence at necropsy of the characteristic hepatic lesions, which are said to be found only in patients dying from eclampsia. They consist essentially of a periportal thrombosis of the lobule of the liver. He asserts that the differentiation may not be possible until several months after delivery, and rests on the question of restoration of renal function, and that the diagnosis of eclamptic or pre-eclamptic toxemia is usually assured if the blood pressure falls to normal and all trace of albumin disappears from the urine by the end of the second or third week after delivery; while the possibility of nephritic toxemia should be considered when the urine still contains albumin and casts at the end of one month. Edgar asserts that although hepatic lesions are almost invariably present, they may be microscopic, even in cases in which the kidney is practically destroyed by acute parenchymatous disease.

For the purposes of this paper, the toxemias of the later months of pregnancy will be divided into three groups: (1) acute toxemias of the eclamptic type; (2) toxemias due to exacerbations of chronic nephritis; and (3) toxemias due to definite renal infection, (a) focal nephritis, and (b) pyelonephritis. The acute toxemias of the eclamptic type include cases without previous evidence of disease of the liver or kidney, in which a syndrome complex, similar to that described by Kosmak, develops. This group may be divided into two subgroups: (1) cases in which there is unquestionable pathologic evidence of disease of the liver and (2) those in which the symptoms of renal involvement may predominate. Volhard, v. Jaschke, and others, believe that parenchymatous disease of the kidneys arising during pregnancy is a definite entity. This study is concerned only with cases which may be classed with the acute toxemias.

Before undertaking the discussion of the renal lesions in pregnancy, Volhard and Fahr's classification of nephritis which is generally accepted, merits review. This is briefly as follows:

1. The nephroses, degenerative
  - (a) Acute
  - (b) Chronic
  - (c) Terminal
2. The nephritides, inflammatory, involving mainly the glomeruli
  - (a) Acute
  - (b) Chronic
  - (c) Terminal
3. Focal nephritis
4. Arteriosclerotic kidney

The characteristics of acute nephrosis as indicated by these authors are, essentially, normal blood pressure, well marked edema, a marked amount of albumin in the urine, lowered urine output, no nitrogen reten-



TABLE I  
FINDINGS IN ELEVEN CASES OF ECLAMPTIC PREGNANCY

	CASE	AGE, YEARS	PARA	BLOOD PRESSURE	EDEMA*	URINE					BLOOD						EYE-GROUNDS
						SPECIFIC GRAVITY	ALBUMIN*	CASTS*	ERYTHROCYTES*	PHENOLSULPHONE-PHTHALEIN, PER CENT	BLOOD UREA, MG.	URIC ACID, MG.	CREATININ, MG.	PLASMA, CARBON DIOXIDE, VOLUMES PER CENT	HEMOGLOBIN (DARE)	ERYTHROCYTES, MILLIONS	
Nephrosis				Normal	Usually present may be absent	High	2 to 4	2	Rare	Normal	Normal						Normal
Nephritis				2	1	High	2 to 4	2	2	Variable	Often increased, rarely not				O.K.		Usually negative, may be positive.
Nephrosis	1 (A322282)	27	II	Normal	1	1.023	4	0	0		38						Retinal edema with detachment.
Nephritis	2 (A37633)	25	I	182 108	3	1.020	3	2	1	50	24			40		2.90	Retinal edema with detachment.
Nephritis	3 (A447426)	21	I	170 96	2		3	2	0		24	7.2	1.5	37	52		Retinal edema with detachment.
Nephritis	4 (A362498)	23	I	178 110	1	1.012	2	2	0		24						Arterial contraction, anemic discs.
Nephritis	5 (A424768)	21	I	170 114	3	1.037	4	2	1	15	57	5.2	2.5	46	65	4.05	Edema of scleral conjunctivae, edema of retina.

TABLE I—CONT'D

Nephritis	6 (A429051)	20	I	182 130	2	1.015	2	2	0		46	2.2	1.7	52		Arteries much re- duced in caliber, exudate and hemorrhage, edema of retina. Negative
Nephritis	7 (A420372)	28	I	180 120	4	1.020	4	1	1	35	44	2.7	1.6	32	80	Hemorrhage. No exudate.
Nephritis	8 (A398002)	26	I	196 140	3	1.029	4	4	1	24	12				4.10	Essentially nega- tive.
Nephritis	9 (A95057)	26	I	188 135	3	1.017	4	1	1	55	21	3.8	1.4	46	75	No edema or hemorrhage. Ar- terial contrac- tion.
Nephritis	10 (A217782)	34	I	180 100	1	1.027	3	1	0	40	14					Negative
Nephritis	11 (A384919)	24	I	176 120	2	1.007	3	0	0	55	20	3.6	1.8	38	75	

\*Findings graded on a scale of 0 to 4.

tion in the blood, and no eye-ground changes. In acute glomerulonephritis, there are hypertension, edema, albumin and macroscopic blood, or microscopic red blood cells in the urine, and the urine output is lowered; rarely is there any increase in blood urea, and eye-ground changes may be present. Histologically, in cases of acute glomerulonephritis, the glomeruli show proliferative and exudative changes in the capillaries and in Bowman's capsules. There are also associated secondary tubular changes.

McElroy asserts that the "kidney of pregnancy" is frequently a purely degenerative lesion of the tubular epithelium. Von Jaschke decides that lesions of the kidney occurring during pregnancy are due to nephrosis, that cases which have hypertension and red blood cells in the urine are atypical and that the term "glomerulonephrosis" may be applied to them. Schmitz quotes Hyneman as saying that the kidney of pregnancy is manifestly a degenerative process, while a true nephritis is of inflammatory origin. Baer states that the kidney of pregnancy seems to occupy a position between nephritis and nephrosis, and Volhard lists pregnancy as one of the causes of acute glomerulonephritis.

Williams avers that the renal lesions which have been classified as nephroses by recent writers, while almost constantly present, are not, as a rule, sufficiently marked to be considered as the characteristic lesion of eclampsia. On the other hand, he and others have found characteristic hepatic lesions in all patients dying from eclampsia.

Dieckmann and Krebs, using the Rosenthal liver function test in a small group of cases, report evidence of impairment of liver function in every case in which there had been sufficient clinical evidence to warrant a diagnosis of preeclampsia or eclampsia. Whenever the patients have been relieved from symptoms by treatment or delivery, the test curves have fallen to normal limits. Recent work by Mann, Bollman and Magath has shown, however, that the functions of the liver have not been thoroughly analyzed. It is not possible to evaluate the phenoltetrachlorophthalein test as a measure of any certain function, although the antitoxic or protective function, as described by Ferguson and Ferguson, may be one which is measured by the elimination of the dye.

Acute yellow atrophy, a rare disease, which may occur in pregnant women, is accompanied by marked jaundice and weakness, and rapidly goes on to a fatal termination.<sup>7, 23</sup> There is no hypertension. The renal lesions are slight, and not similar to those of the eclamptic state. Mann and Magath found that after removal of the liver in dogs, the blood pressure is practically normal while the animal is active. When the first symptom develops, the blood pressure decreases, but does not necessarily fall to a low level.

A review is presented of eleven cases of eclamptic toxemia, which came under my personal observation and care, in ten of which the clinical picture simulated acute glomerulonephritis. (Table I.)

## REPORT OF CASES

CASE 1.—Mrs. M., aged twenty-seven years, developed nephrosis with her second pregnancy. She had gone through her first pregnancy without any untoward symptoms. She was under our observation for the last five months of her second pregnancy. Albumin appeared in the urine in the ninth month; this, with slight edema, and a hemoglobin of 60 per cent, comprised the only abnormal findings. The patient is now six months in her third pregnancy, and so far has had an entirely uneventful course. The urinary findings with the edema and the normal blood pressure are typical of nephrosis.

CASE 2.—Mrs. J., aged twenty-five years, had some edema, and albumin in the urine at the fifth month of her first pregnancy; this cleared up under treatment, but reappeared ten days prior to her first examination by us, at the thirty-fifth week of gestation. At this time her blood pressure was 168 systolic and 100 diastolic. Her eye-grounds were essentially normal. In the next six days, in spite of active treatment, all symptoms increased, and five days later her blood pressure was 182 systolic and 108 diastolic. Lobulated detachments of both retinæ appeared. These became reattached, and her condition returned to normal. The patient is now in the last months of her second pregnancy; her blood pressure is normal; there is no albumin; the renal function is normal and only a few old pigment changes are visible in the eye-grounds.

This patient had been examined at the Clinic several times prior to her first pregnancy, and no evidence of nephritis was ever found.

CASE 3.—Mrs. Z., aged twenty-one years was first seen by us about the thirty-fourth week of her first pregnancy. There was nothing of note in the past history except an abortion at three months of unknown cause, from which she convalesced normally. One week before examination she had developed headache, blurred vision and progressive edema of the lower extremities, hands and face.

On examination, the patient's blood pressure was 176 systolic and 96 diastolic. She had edema, 3, and there was albumin 3 and casts 2 in the urine. The eye-grounds showed contraction of the arteries with edema, and detachment of the retina in the inferior nasal quadrant. Labor was induced, and the uterus was emptied the following day under sacral anesthesia. Two days postpartum, the eye picture was much more acute, with generalized edema, large lobulated detachments, and a barely discernible disc. From this date, however, improvement was progressively rapid. On the sixth day postpartum, the blood pressure was 118 systolic and 82 diastolic, there was still albumin in the urine, and a few hyaline casts. On the seventeenth day postpartum, the eye-grounds were normal except for scattered pigmentary spots and slight perivascularitis. Subsequent examinations have shown complete recovery of the renal function, with no albumin, and normal blood pressure.

CASE 4.—Mrs. M., aged twenty-three years, gave birth to her first child November 11, 1923. She came to the Clinic early in pregnancy because of rather marked hyperemesis, from which she entirely recovered. She had had mitral insufficiency in June, 1921, but the urine and blood pressure were normal at that time. In the eighth month of pregnancy, her blood pressure read 140 systolic and 94 diastolic; the urine was normal. Early in the ninth month, the blood pressure had risen to 148 systolic and 104 diastolic, and urinalysis revealed albumin 2, but no casts. Careful observation was maintained, and as the blood pressure continued to rise, the patient was hospitalized. The usual regime of treatment brought the pressure down, and lessened the edema. This, and the fact that her eye-ground showed nothing but a definite contraction of the arteries, led us to carry her along. De-

livery occurred twelve days later, forceps being used because of a protracted second stage. The patient went into "shock," but after rallying from this, had a good convalescence. She had rather marked anemia, which no doubt contributed to her behavior during labor, as she did not lose much blood at the time.

At examination, July 30, 1924, the blood pressure was 132 systolic, 90 diastolic, specific gravity 1019, and no albumin.

CASE 5.—Mrs. T., aged twenty-one years, had had scarlet fever at the age of two, and influenza at sixteen, but there was no history of nephritis. Her first pregnancy was uneventful until the middle of the eighth month. She had no prenatal care prior to this, first reporting to her family physician May 2, 1923, when she complained of blurred vision, and swelling of the extremities. He found her blood pressure to be 190 systolic, and albumin 4 in the urine. Advice was given her regarding diet and purgation, but she failed to follow it.

On the following day the patient had a convulsion at noon, and another, one and one-half hours later. She was given  $\frac{1}{4}$  gr. morphine by hypodermic, and was brought to the hospital. Shortly after her arrival she had the third and last convulsion. There was subscleral edema of the cornea, hyperemia with a suggestion of edema of the nerve head, and subretinal edema and one small hemorrhage above the disc of the right eye. At reexamination two months later, both fundi were negative, except for slight degeneration about the left macula. Under treatment, her condition improved somewhat, and then remained stationary. Labor was induced May 9, 1923, and she was delivered of a viable babe on the following day. After this her condition rapidly improved, the blood pressure on the thirteenth day postpartum being 120 systolic and 80 diastolic, and the albumin in the urine was reduced to 2. On reexamination four months later, the patient's blood pressure was 125 systolic and 80 diastolic. Urinalysis revealed specific gravity 1013, acid reaction and albumin 1.

It is of interest to note that the blood urea and creatinin dropped from 57 and 2.5 to 16 and 1.4, respectively, the former reading being taken three days prepartum, and the latter, one day postpartum.

CASE 6.—Mrs. G., aged twenty years, was admitted to the hospital for her first pregnancy June 18, 1924. This patient was examined at the Clinic in 1923 for simple goiter. There was no evidence of nephritis at that time. The last menstrual period was late in September, 1923. The patient had no prenatal care, and one month before admission noticed headache, and gradual onset of edema, which increased to 3. One week before coming to the Clinic, she had a convulsion, and was given catharsis and morphine. In spite of this, she had two more convulsions.

On admission, the blood pressure was 182 systolic, and 130 diastolic. There was albumin 2 in the urine, and edema 2 of the extremities. The arteries in the eye-grounds were much reduced in caliber; there was a small hemorrhage above the disc of the left eye, and the nasal retina in the right was edematous, a retinitis of eclampsia. Two hundred cubic centimeters of blood were removed by venesection. Labor was induced by packing, and on the following day, June 19, the patient delivered. Eleven days later, the blood pressure was 130 systolic and 108 diastolic. There was still a faint trace of albumin in the urine.

This patient has not returned for examination since her dismissal from the hospital, and the question of permanent renal damage or recovery cannot, therefore, be determined.

CASE 7.—Mrs. D. N., aged twenty-six years, was admitted to the hospital for her first pregnancy March 15, 1923. She had had repeated severe attacks of tonsillitis until tonsillectomy, two years before. Labor was spontaneous two days

after admission. The blood pressure dropped rapidly to normal. The patient returned for examination nine months later, at which time no residual renal impairment was evident.

CASE 8.—Mrs. S., aged twenty-six years, came to the Clinic July 13, 1922, in the middle of the eighth month of her first pregnancy. She had had pneumonia and pleurisy in 1906, and occasional attacks of tonsillitis. During the last few years, she had been subject to swelling of the feet, when standing or walking much.

Examination revealed a blood pressure of 196 systolic and 140 diastolic, edema 3 of the legs, vulva and lumbar region, edema 1 of the face, albumin 4 in the urine, and marked mitral insufficiency.

Examination of the eyes revealed slightly irregular fundi, contraction in caliber of a few of the retinal arteries (spasm?) and dilatation of others. A few days later, several small retinal hemorrhages were noted. The patient improved slightly at first, but beginning fourteen days after admission, had almost complete anuria for three days. She went into labor spontaneously on the seventeenth day, and thereafter improved steadily until her blood pressure and renal function became normal. The retinal hemorrhages disappeared two weeks postpartum, except for a trace of one.

A year later she went through an uneventful pregnancy and confinement without any evidence of nephritis and with no untoward symptoms.

CASE 9.—Mrs. G. N., aged twenty-six years, came to the Clinic on October 31, 1923, for her first pregnancy. She had had an appendectomy for subacute appendicitis, and ligation of both superior thyroid arteries for hyperthyroidism at the Clinic in 1913. At that time, her blood pressure was 130 systolic and 80 diastolic, and there was a faint trace of albumin in the urine. There had been no prenatal care during the pregnancy, although a physician had examined the urine several times for albumin without finding any until a week prior to admission. The patient had noticed headache, and swelling of limbs during the last ten days.

There was no evidence of nephritis in the fundi, there being only slight tortuosity of certain arteries and slowing of the stream.

After admission to the hospital, the amniotic sac ruptured spontaneously, and the patient went into active labor and was delivered of a dead, slightly macerated fetus on November fifth. On the tenth day postpartum, her blood pressure was 130 systolic and 90 diastolic, and there was albumin 2 in the urine. There is still a trace of albumin, and her blood pressure ranges from 124 systolic and 84 diastolic to 136 systolic and 90 diastolic. She is now about six and one-half months pregnant.

CASE 10.—Mrs. J. N., aged thirty-four years, came to the Clinic in the third month of her first pregnancy. In 1918, she had had an appendectomy at the Clinic. At that time her blood pressure was 138 systolic and 82 diastolic, the urine and other findings being normal.

Examination revealed blood pressure of 140 systolic and 80 diastolic, and normal urine. As the patient was leaving the vicinity for the remainder of her pregnancy but expected to return for confinement, she was given advice concerning prenatal care, and instructions to consult a physician regularly. She returned during the thirty-eighth week, complaining of edema which had developed about ten days before, and was rapidly increasing. At this time her blood pressure was 180 systolic and 100 diastolic, and urinalysis revealed albumin 3, casts 1, red blood cells 1, edema 1. Examination of the eyes revealed slight reduction of the fundi, irregularity in the caliber of the retinal arteries, exaggeration of reflexes, and mild arteriovenous compression. No edema, hemorrhages or exudates were seen, but one small area of old choroiditis was found. The patient improved, and de-

livered two weeks after admission, following which her blood pressure dropped to normal, 120 systolic and 80 diastolic, on the twelfth day, and the albumin was reduced to a trace.

The slight hypertension in this case, early in pregnancy, brings up the question of a preexisting chronic nephritis. This can be ruled out, however, by the normal blood urea at the height of the illness, and the rapid return to normal.

CASE 11.—Mrs. M., aged twenty-four years, came to the Clinic March 2, 1924, in the seventh month of her first pregnancy. She had been examined previously for neuritis, at which time the blood pressure had been normal, and only a faint trace of albumin had been found in the urine. She had had no prenatal care and came under our care following a convulsion. She had noticed swelling of her feet for two weeks and three days prior to the convulsion, and complained that she had smelled and tasted smoke.

In spite of treatment, the patient had two more convulsions, following which 300 c.c. of blood were withdrawn by phlebotomy. Two days later the uterus was emptied, following which she improved and on the eleventh day postpartum, her blood pressure was 120 systolic and 80 diastolic, and there was albumin 2 in the urine. Shortly following this, she was dismissed from our care, but reports have been received that she has developed chronic nephritis.

The normal blood urea, normal kidney functional test and normal ocular fundi would rule out a preexisting chronic nephritis.

#### DISCUSSION

Case 1, which is classified as a nephrosis, is sharply differentiated from the other cases by the absence of hypertension and the mildness of symptoms. As a group, the remainder had a lessened urine output, the lowest amount usually corresponding to the height of the illness. An increase in urine output generally accompanied improvement, especially the rapid recovery following delivery. Four of the patients had edema of the retina, resulting in its marked detachment in two instances. All but three of the ten patients had evidence of some change in the ocular fundus. All had marked hypertension. Most of the patients who are reported to have had no evidence of chronic nephritis following recovery, on return for reexamination were given water and concentration tests following Volhard's method, as well as the routine blood pressure, urine, blood urea and phenolsulphonephthalein tests.

Granting the existence of hepatic lesions in patients who die from eclampsia, the question may be raised as to their relation to the production of the characteristic picture of eclamptic toxemia. On the other hand, this characteristic clinical picture is almost identical to that of acute glomerulonephritis in the nonpregnant individual, that is, hypertension, edema, retinal changes, lessened urinary output, albumin in the urine, and often red blood cells, which, however, are not always found. According to McElroy and v. Jaschke, hypertension does not occur in nephroses, yet Litzenberg, de Snoo, Mussey and Randall, and Adair have found that hypertension is practically always present in cases of pre-eclamptic toxemia, is usually one of the first signs, and is probably the most constant clinical sign of the onset of the toxemia. McElroy says

that in acute glomerulonephritis the highest pressure corresponds to the height of the disease, as indicated by the urinary findings. This, in turn, is true of the hypertension of the toxemia of pregnancy.

Volhard considers as incorrect the usual conception that acute glomerulonephritis is incurable. As long as the causative agent has not set up irreparable damage in the glomeruli, the parenchymatous degeneration is capable of restoration if the glomerular circulation is speedily restored. Volhard has a plausible theory that the ischemia of the capillary tufts and loops is a functional condition, an angiospastic anemia. This, he says, is borne out by clinical experience in that the disease cures itself after a restoration of the glomerular circulation and leaves no trace in the vessels, the prognosis resting on the duration of the anemia rather than on the severity of the nephritis, for secondary and severe organic changes may occur in the vessels following a long duration of the anemia. Relief of the pressure by decapsulation removes the anemia of the tufts, and a rapid restoration to normal occurs.

Volhard's theory fits in well with the findings of Hinselmann with the capillary tonometer. He believes that the renal changes found in pregnancy are due to a spasm of blood vessels of the glomeruli. In cases of hypertension in the toxemia of pregnancy, he was able to demonstrate a distinct spasm in segments of the capillary wall with resulting dilatation of other portions of the tube, an intermittent spasm causing a complete stagnation 65 per cent of the time. Following delivery, this disappeared and coincidentally the blood pressure began to fall. Von Leyden pointed out that one of the characteristics of the true nephropathies of pregnancy is the rapid disappearance of all symptoms following the emptying of the uterus by natural or artificial means.

The edema of preeclamptic toxemia is probably produced by the same factors as the edema of any renal disease. It is beyond the scope of this paper to decide whether it be due to any injury of the capillary endothelium resulting in increased permeability and escape of fluids, as maintained by Volhard and Zangemeister; to increased affinity of tissue colloids for water, owing to the accumulation of acids in the tissue, as Fischer believes; or to failure of the kidney to excrete salt and water, Widál's conception. The nervous and convulsive symptoms are, in turn, probably the result of edema of the central nervous system.

The details of treatment will not be discussed here. Kosmak has indicated that the same general lines of treatment should be followed for the toxemias of the later months of pregnancy, whatever the cause. The treatment of our cases has been along the general lines of elimination, low protein, low salt diet, sedatives and venesection, as indicated, and in a few instances, induction of labor. In recent cases, the use of calcium or ammonium chloride, for diuretic purposes, as suggested by Keith, has been followed by markedly increased urinary output, lessened edema, loss of weight, lowered blood pressure and general improvement.



## SUMMARY

The symptom complex of "preeclamptic toxemia" is often identical, in clinical symptoms and renal function, with that of acute glomerulonephritis. The outstanding features in this study are the comparatively rapid onset of symptoms which obtained in most of the cases, the hypertension and its rapid fall to normal, usually coincident with the increased urinary output, the disappearance of the edema, and amelioration of symptoms. The comparative absence of nitrogen retention in the blood, and the apparently complete recovery of most of these patients is also similar to those patients with acute glomerulonephritis. In some cases of toxemia, there is no question that the symptoms of nephrosis predominate.

As this study lacks histologic data, comment is made only on the similarity between the clinical picture and renal function of the two groups. The subdivision of parenchymatous nephritis into glomerulonephritis and nephrosis has been made so recently that the question may be raised of the need of additional studies of the histology of the kidneys in similar cases which come to necropsy.

Although characteristic hepatic lesions have been found in practically all patients dying from eclamptic toxemia, there is no definite evidence that these lesions are the cause of the symptom complex.

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## THE RELATION OF POSTOPERATIVE PERITONITIS TO PERIODIC EPIDEMICS OF INFECTION\*

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THE subject of postoperative peritonitis is one that will always engage the most important consideration. That it so seldom occurs does not relieve the surgeon of the constant feeling of responsibility in regard to technic. The great success of abdominal surgery and the wonderful confidence that has been acquired by the people in its powers of relief and cure has been made possible only by the development of the principles of cleanliness in the operating room. We have arrived at a place when, if peritonitis follows an operation where under ordinary circumstances it should not occur, we at once question every step of the procedure. There is always the question of some break in the chain in so far as operating room technic is concerned. There is also the question of a leak from an intestinal suture or the failure to close an undiscovered tear in the intestinal wall. The freeing of a streptococcus in the separation of adhesion of fallopian tubes caused by this form of infection is always possible.

Our experience leads to the belief that other conditions, not entirely local and not due to carelessness on the part of the operating staff, may occasionally account for deaths from peritonitis. The reasons for this conclusion have grown out of a noticeable increase in our mortality from this cause during the period extending from 1917-18 to 1924 as compared to a similar period previous to that time. The mortality in our work from postoperative peritonitis previous to 1917-18 had been 2 per cent. Since that time it has doubled and has been 4 per cent.

In a study of our records previous to the last five or six years it is not difficult to account for most of the cases of peritonitis, as they were due to causes that were apparent either at operation or autopsy. Since that time there have been a number which could not be explained either before or after death. They have occurred in several instances when

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least expected and where the most careful analysis did not reveal any excuse for the catastrophe. During the severe epidemics of influenza in the years 1918 and 1919, several patients were seen who had been referred for operation on account of some intraabdominal condition, which had been diagnosed as peritonitis, secondary to appendicitis or salpingitis. These cases presented an unusual picture in so far as the abdominal symptoms were concerned. There was pain and tenderness with distention, but positive signs of localization were absent. The temperature was unusually high, the leucocyte count usually low, and the general appearance, especially the purple or blue color of the skin and mucous membranes strongly suggested influenza. They all recovered with the exception of one woman who died in forty-eight hours of what seemed like a typical case of influenza with peritonitis. Unfortunately no autopsy could be obtained. None of these cases were operated upon.

In March, April and May of 1917, three deaths occurred which seemed entirely unnecessary. Previous experience could in no way account for them, as after each one a careful survey did not reveal any reason for such a complication, so far as sterilization or operative technic were concerned. In two of them, however, we found a history of a recent attack of influenza. A brief summary of these cases is given in order to emphasize the simplicity of operation and to indicate the unusual result.

CASE 1.—S. J. History No. 2242, March 13, 1917; age twenty-three years.

Operation.—Laparotomy, appendectomy, suspension of uterus.

The appendix was removed and the round ligaments shortened after the method of Gilliam. (During the course of the procedure, a small cyst of the right ovary about the size of a hickory nut ruptured. A clear fluid escaped.) Patient gave a history of two attacks of influenza previous to operation. After operation, almost immediately signs of peritonitis developed and she died on the third day from a rapid spreading peritonitis of streptococcic origin.

Autopsy showed general peritonitis and retroperitoneal cellulitis in the broad ligaments, a condition similar to that seen in puerperal infection.

CASE 2.—Mrs. J. H. History No. 2295, April 9, 1917; age thirty-seven years.

Operation.—Amputation of cervix, perineorrhaphy, laparotomy, double salpingectomy, appendectomy.

Patient gave a history of previous attacks of sore throat. One attack of influenza ten years previous to operation. Has had bronchitis over a period of years and has suffered from acute pains in the chest muscles at intervals. They are described as sharp, shooting pains and are present in the lower thorax on both sides. There is shortness of breath on slight exertion.

No difficulties were encountered during the operation and there was no reason that the patient under ordinary circumstances should not make an uneventful convalescence. Patient almost immediately after the operation showed evidences of beginning peritonitis, having an unusual amount of pain and distention, rapid pulse, etc.

She died on the fourth day from a streptococcic peritonitis.

After a careful study of the histories of these patients and the experience during the following year, when we had much influenza, we reached the con-

clusion that it is unsafe to operate upon anyone who had had a recent attack of influenza, unless the operation was imperative. This decision when finally reached, has been strictly adhered to.

With the feeling that all infections eventually die out and that an attack of influenza should not debar operation for all time, it was again undertaken in a patient who gave absolutely no contraindication except the history of influenza two years before in 1918. A brief summary of this case should be of interest.

CASE 3.—Mrs. G. W. History No. 2049, January 25, 1920; age nineteen years.

Operation.—Curettage. Suspension of uterus, excision of cyst of the right ovary, appendectomy.

Patient gave a history of influenza in 1918. The principal complaint was pain in the right lower quadrant of the abdomen, and backache. Laparotomy revealed the presence of considerable free fluid in the pelvis. The uterus was retroverted. The adnexa were normal except for a corpus luteum cyst at the upper pole of the right ovary, which was the size of a hickory nut. This was removed without rupturing by excision and the wound closed with catgut. The uterus was suspended by the modified Gilliam method. The appendix was removed in the usual way. The incision was closed without drainage.

On the evening of the second day following operation, there was marked increase in the pulse rate with vomiting and pain in the abdomen. Patient was also in a state of collapse, and the mucous membranes were pale. The symptoms indicated the beginning of a streptococcic peritonitis. Patient's condition grew worse rapidly and she died the following day. The fluid from the peritoneal cavity showed the presence of streptococcus. This death recalls the presence of fluid in the peritoneal cavity at the time of operation and the observation made then of the great probability of previous infection in the peritoneal cavity.

The report of two patients, who gave a history which would suggest the beginning of an infection in the gall bladder as a result, or at least coincident with, the attack of influenza are also of interest:

CASE 4.—Mrs. M. H. History No. 21-322, September 8, 1921; age fifty-one years.

Operation.—Cauterization of cervix, excision of polypus from cervix, hysterectomy, appendectomy, cholecystectomy.

A study of the patient's history reveals pains in the extremities and several attacks of neuritis; presence of swelling about the knee joints. History of influenza: during the attack patient had extreme nausea and vomiting. The history suggests a close relationship between the attacks of influenza and cholecystitis.

Patient died on the fourth day following operation from peritonitis, streptococcic in origin without apparent cause in so far as technic was concerned.

CASE 5.—Mrs. J. S. History No. 22-129, January 7, 1922; age forty-five years.

Operation.—Appendectomy, cholecystectomy, separation of adhesions, drainage.

Previous history of influenza. The omentum was adherent and there were a number of enlarged glands along the common duct. The adhesions were divided and the gall bladder removed in the usual way. The operation was followed by peritonitis. Patient died on the fourth day. Autopsy was not permitted. The symptoms were those characteristic of a streptococcic peritonitis.

CASE 6.—Mrs. E. G. History No. 23-336, September 30, 1923; age thirty-seven years.

Operation.—Bilateral salpingectomy, appendectomy, excision of Bartholin gland, removal of cyst of right breast.

This patient had a chronic infection of both tubes with adhesions. History had been that of recurring attacks of pain gradually increasing in severity. There

had been no recent attack accompanied by elevation of temperature. Patient on admission gave a history of having had a cold in May. She was a strong healthy woman and little apprehension was felt as to her ability to withstand an ordinary salpingectomy.

The patient's convalescence was uneventful until the third day when symptoms of peritonitis developed and the patient grew rapidly worse, a true picture of rapidly spreading streptococcic infection was presented, rising temperature, rapid pulse and cold hands. She died on the seventh day following operation.

This patient was a very healthy woman in so far as her appearance and history were concerned; she made every effort to make it appear that she had always been in good health, and except for pain in the lower abdomen, she had no complaints. She was considered a good operative risk. After operation careful inquiry from her family showed that she had been quite sick from an attack of influenza three months previous to operation, but the patient had insisted that it was nothing but a cold.

These experiences have led to the belief that there has been some relationship between this postoperative complication and the influenza epidemics that have occurred during the last six years. Unfortunately, the bacteriologic findings are in no way helpful, so far as any direct evidence is concerned. In all of the cases of peritonitis reported the streptococcus has been the offending organism. It would seem that much doubt still exists as to what relationship there may be in the action of certain bacteria. Whether the bacillus of influenza lowers resistance and prepares the way for an easy assault by the more virulent strains of the streptococcus or whether it has a more direct relationship is an interesting problem.

The persistent symptoms from focal infections streptococcic in origin, which have their inception in an attack of influenza, would seem to so indicate. Not infrequently a patient gives a history of aching and soreness in the joints and muscles, which have persisted over a long period of time, where the source of infection lies in the tonsils, and where the patient never had any such symptoms previous to influenza. When cultures are taken from an enclosed abscess in such a tonsil, it is the streptococcus that is found.

We believe that the same thing is sometimes true in infection of the gall bladder, and we have grown to be fearful in the removal of a gall bladder where the onset of symptoms followed an attack of influenza. My associate, Dr. Cashman, has reported two fatalities in such cases, where a simple, uncomplicated cholecystectomy was done. The peritonitis which promptly followed was invariably due to the streptococcus. Infections of various kinds are not infrequently observed in wounds far removed from the primary focus. The occasional phlebitis which may be located either in the veins of the leg or broad ligament are doubtless in many instances secondary to these distant foci. May it not be true that bacteria lurk constantly in the lymph spaces or possibly in the blood stream itself?

If influenza is a factor in the predisposition to peritonitis, it must be due either to a most persistent effect in lessening the normal resisting powers to other forms of infection, or that in some way it stimulates activity and virulence. The effect, in a clinical way, of the bacillus influenza, is certainly not unlike that of the *Streptococcus viridans*.

Another interesting feature in our study is that 80 per cent of all deaths from peritonitis occurred in the months from January to April, the season when infections of all kinds are most prevalent. There is little doubt that wounds heal more kindly and that danger from all infections is less when the sun shines best.

If these observations are based upon right conclusions, then added responsibility is placed upon the surgeon who does elective work in the abdomen. In addition to the assurance that all of the ordinary foci of infection such as exist in distant organs, as above mentioned, have been considered, he will be called upon to use extra care in the study of the history of his patient in regard to previous infections, such as influenza.

It would seem logical that clinical data of this character should serve as a foundation and stimulant to the work of the bacteriologist until these important questions are settled.

WESTINGHOUSE BUILDING.

(For discussion, see p. 868.)

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## A SEMICIRCULAR MATTRESS SUTURE OF THE VAGINA IMMEDIATELY FOLLOWING LABOR\*

BY RANDALL S. TILLES, M.D., ST. LOUIS, MO.

IN practically every delivery at term the pelvic floor of primiparas and many of those of multiparas, is damaged to some extent. The only patients who may escape this injury are those who give birth to babies with very compressible heads or those who possess an excess of elastic tissue in the fibrous sheaths of the pelvic floor. Even when the tear is repaired immediately after labor, it is a common experience to find upon examination at a later date, a more or less relaxed pelvic floor with a gaping outlet, a small incipient rectocele or a sagging anterior vaginal wall conducive to a cystocele. The sequellae to pelvic floor relaxation are too well known to need discussion. I have tried, in the past, a number of different operative procedures to restore the damaged pelvic floor and have met with only varying degrees of success and many disappointments, until I began to use the method to be described.

This communication deals not so much with the general method of repair of tears involving the perineum and vagina but with the insertion of supportive sutures for the support of an overstretched vagina, either in multiparas or primiparas even when no tear has occurred.

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\*Read at a regular meeting of St. Louis Gynecologic Society, January 9, 1925.

I wish to emphasize here that the levator ani muscle arises from above and laterally and in these regions it is well protected against injury. As it descends around the vagina and rectum, its point of attachment is not to bone as most commonly occurs but to the muscles of the opposite side. It is protected and reenforced to a great degree by the various layers of pelvic fascia. This posterior portion undergoes marked changes during labor, being pushed downward and backward and subjected to

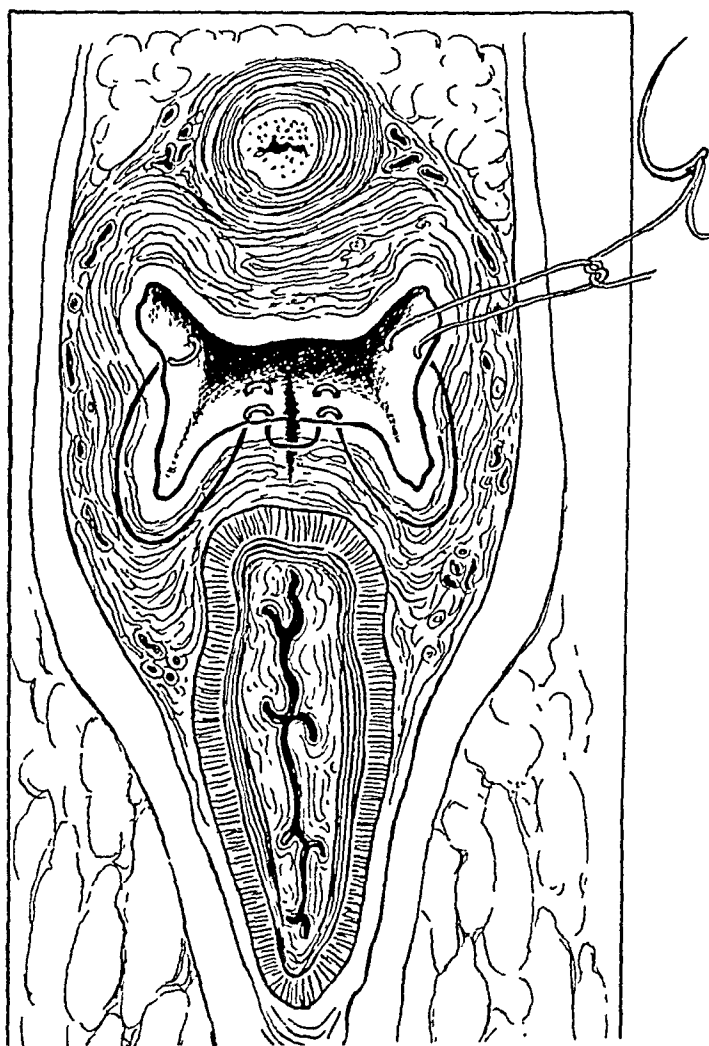


Fig. 1.—Transverse section of lower portion of vagina, showing the tissues into which the stitch is inserted. Note how it surrounds the lateral and posterior walls of the vagina.

great stretching, and converted into a thin-walled tubular structure. The most marked change consists in the stretching of the fibers of the levators and thinning of the central portion of the perineum which becomes transformed from a wedge shaped mass five centimeters thick to a thin almost transparent structure two to four millimeters in thickness which is pushed down about 2.5 centimeters from its original position. When the perineum is distended to the utmost, the anus becomes markedly dilated and presents an opening two to two and one-half centi-

meters in diameter through which the anterior wall of the rectum or rather the rectovaginal septum is seen to bulge. With the advance of the presenting part stretching and pushing these muscles before it, there undoubtedly occur many separations of the muscle fibers as well as

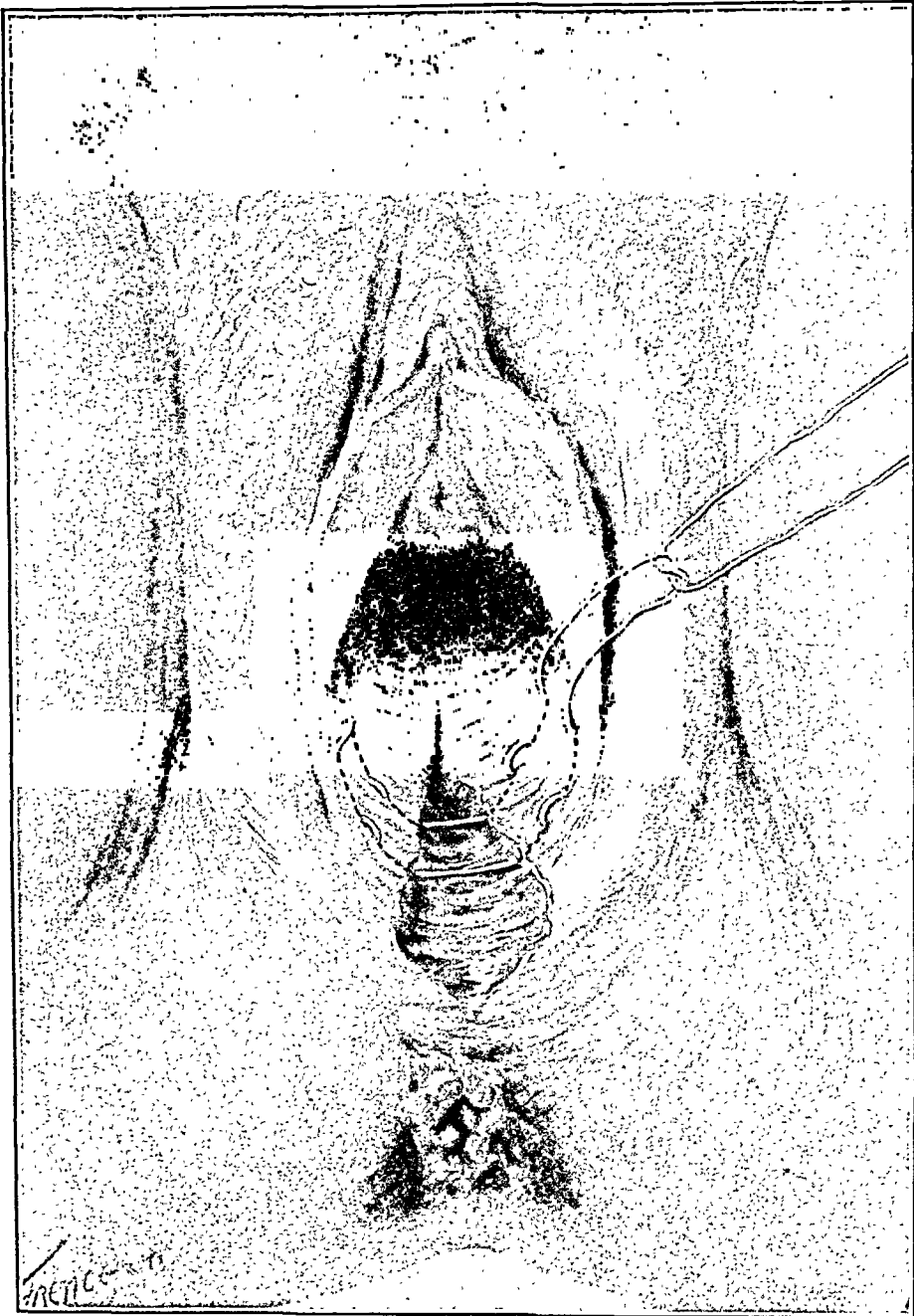


Fig. 2.—Shows the insertion of the stitch as described in the text. Inserted before the vaginal and perineal tear is repaired.

tears in the fibers of its facial covering. This injury to the muscle and fascia often occurs without any evident laceration in the overlying mucous membrane. When tears of the vaginal mucous membrane occur, it is the common practice at the present time, to repair this defect by



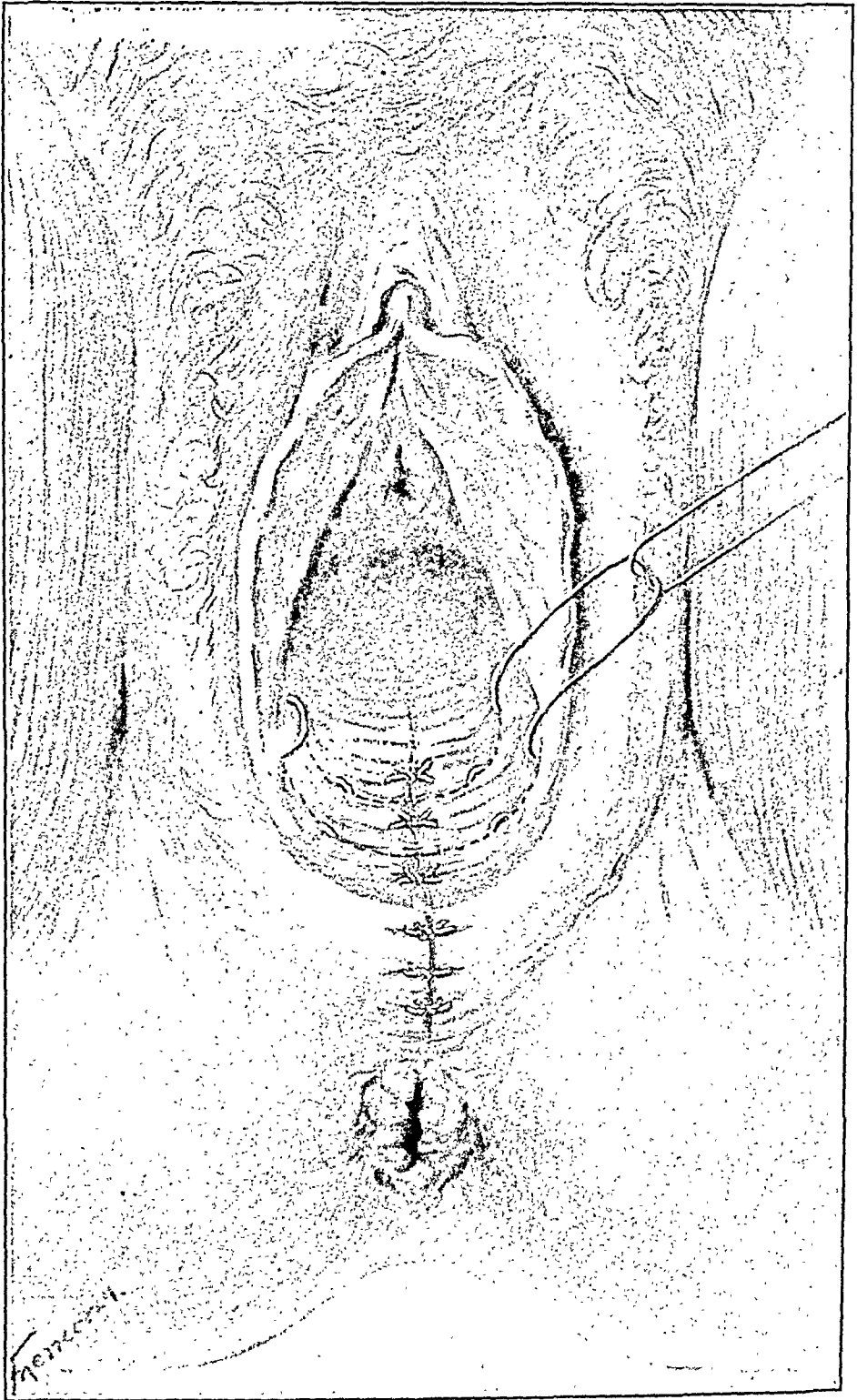


FIG. 3.—Shows the stitch inserted but not tied, as it is applied either before or after the tear is repaired, or how it would appear in a multiparous vagina with no tear.

uniting its torn margins with interrupted or continuous sutures. In the process of healing, the torn edges become united by a process of cicatrization; yet nothing is done to favor the repair of the submucous injuries whether to muscle or fascia. This leaves the lower end of the vagina relaxed and overstretched, and in spite of a high, well repaired perineum

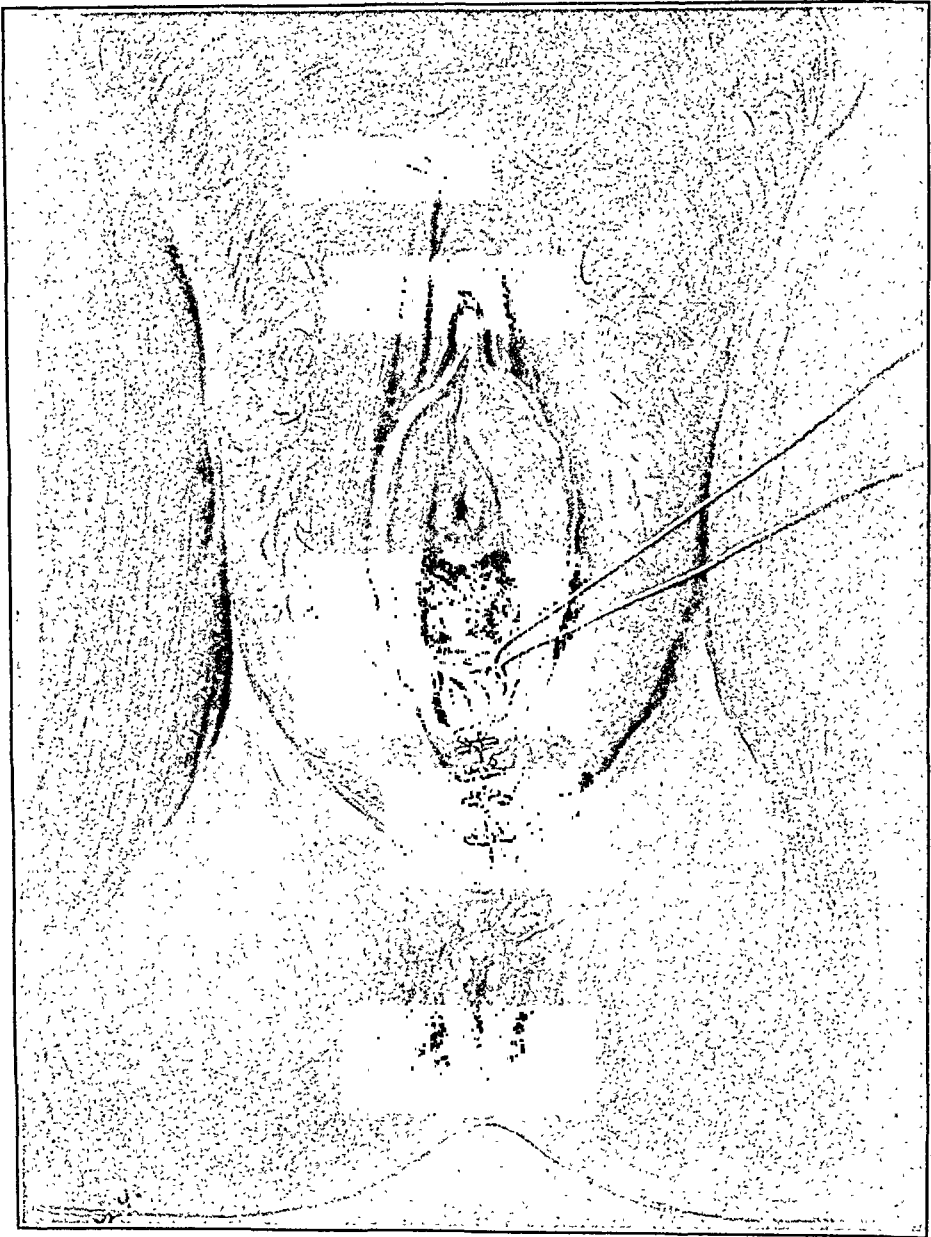


Fig. 4.—Shows the completed effect of the tied stitch. A, The longitudinal folds into which the vagina is thrown after tying. B, The lifting effect of the vagina and perineum. C, The small vaginal outlet.

the tone of the supporting muscle and fascia of the lower portion of the vagina is absent.

It is then evident that injuries to the lower vagina and perineum may be of three distinct types.

1. A laceration through the mucosa involving both muscle and fascia.

2. An injury not involving the mucosa, but effecting only the sub-mucous fascia and muscles.

3. A combination of both, where a laceration of the mucosa, muscle and fascia is associated with submucous injuries in the adjacent and outlying tissues.

Muscle when torn, has the power of immediate retraction but not so with fascia. Fascia once torn, with its parallel fibers separated does not possess this quality and if not immediately repaired remains as a loose flaccid tissue sheath.

Repair of the laceration if such is accomplished, means the uniting of the fibers of the levator ani, if the tear is high; and also those of the constrictor vagina and transversus perinei, and we delude ourselves into the satisfactory feeling of having made an effective and nice looking correction of the lesion. Yet this repair is made merely in the line of tear. The outlying fascia of the lateral vaginal walls and the posterior vaginal septum remains overstretched with fibers torn or separated. This will in time, under the influence of increased abdominal pressure at defecation, on coughing, sneezing and lifting begin to pouch, and upon examination later, four to eight weeks' postpartum, a marked rectocele is beginning to appear in the lower vagina, just beyond the point of repair of the previously lacerated perineum. Inspection may show a well preserved vaginal outlet. Palpation from the vagina reveals a high muscular perineum, that is high from anus to fourchette. Digital examination of the rectum will reveal above the internal sphincter a thin relaxed overstretched rectovaginal septum, which is already an early or incipient rectocele. Upon separation of the labia, a definite protrusion of the septum is visible and very often the same condition is observed in the anterior vaginal wall in which the bladder is finding its way into the vagina and toward the vaginal outlet. In the description of the method of repair which I present this condition can be overcome to a great extent. The intention is to so pucker and draw together the lower vaginal tube, especially its posterior and lateral walls, and by this means bring into closer proximity the fibers of the overstretched fascia and muscle, and by relief of strain, induce them to reach a stage of involution and repair just as is accomplished in splinting a fracture or sprain of an injured extremity. The evolution of the insertion of the stitch to be described, is rather interesting. At first three or four interrupted sutures were used, inserted one below the other, beginning in the left lateral wall, crossing the posterior wall, and up the right lateral wall. After drawing these sutures together and tying, it was found that the vagina was so narrowed that if tied before the delivery of the placenta, it was impossible for it to be expelled through the vaginal canal. It was further found that when the suture was so inserted, that there was an exposed strand of catgut extending across the vagina from side to side

which, on account of moisture, strain, and its exposed position, was very quickly absorbed, giving a result that was not particularly satisfactory. To overcome this difficulty the suture was inserted as above, but instead of carrying a strand of exposed catgut across the vagina, the needle was reinserted along the right lateral wall at a lower level and carried back to the left lateral wall, ending about one inch below the point of starting. This corrected the difficulty and resulted in practically a mattress suture encircling the lower half of the vaginal tube. At this time two such sutures were inserted which resulted in four transverse strands of catgut across the lower third of the vagina. Within a short time it was found that one suture composed of its two arms was sufficient if properly inserted. This practice has been continued now for the past nine or ten months and has been found surprisingly satisfactory. The suture as now used is inserted as follows: A small curved, noncutting needle is used, which carries a No. 2, 20-day chromic catgut suture and is inserted before the delivery of the placenta. The outlet whether torn or not is retracted by two small towel clips inserted at the hymenal ring, one on each side, about the level of the right and left sulci of the vagina. A tampon is inserted to protect the field from blood. With slight retraction on the left towel clip, the left lateral wall of the vagina is exposed. The first suture is inserted about two inches above the hymenal ring, well out and high upon the left lateral wall of the vagina, penetrating deep enough to catch the lateral fascia and underlying muscle of the anterior portion of the levator ani. The next bite is inserted at the same distance from the vaginal outlet, in the left lateral posterior portion of the vagina which practically encircles the left lateral sulcus. The third bite is carried across the posterior surface of the vagina in the middle line, where care must be taken to catch the fascia but not to penetrate the underlying rectum. The suture is then carried in a similar manner upward through the right lateral posterior wall, then through the right lateral wall and emerges at a point opposite that of its insertion. This gives the first superior transverse arm of the suture. From this point the suture is inserted downward at a right angle through the right lateral wall, the point of the needle emerging just above the hymenal ring on the right side. The suture is then carried in reverse manner across the lower end of the vagina, the successive bites including respectively the right lateral wall, the right lateral posterior wall, the middle portion of the vagina, into the left lateral posterior wall and then upward in the left lateral wall, ending at the same level laterally as the beginning of the suture. The ends are left long and placed in a clamp. If a tear has occurred, the usual manner of repair of the lower vagina and perineum is completed. The above stitch in no manner has been relied upon to act as a repair as ordinarily carried out. The placenta is now delivered and the semicircular stitch as it is called, is pulled together, each strand being pulled firmly but gently and tied. If prop-

erly inserted the lower portion of the vagina is so puckered and enfolded and lifted to a higher position, that the vagina and outlet just comfortably admit two fingers.

The results of this procedure as observed over the period of the last few months have been most gratifying and astounding in their permanency. No sagging of the outlet has been observed. A well marked transverse band in the lower portion of the vagina is present, resembling in its effect the normal nulliparous outlet, and with a finger inserted into the rectum the rectovaginal septum gives the impression of being thicker, if possible, than before the birth of the child. The resultant effect is that the overstretched or separated fibers of the lower unsupported vagina are caught and lifted upward and held to the well supported and protected tissues of the lateral walls. This support allows the healing process to take place with the tissues in practically their normal relationship and in my opinion accounts for the effects obtained.

The most surprising result, and in a way unexplainable, has been observed where the stitch was inserted in multiparous vaginas, with a marked relaxation and a wide gapping outlet, where no tear had occurred. Upon examination six to eight weeks later, the vagina was definitely smaller at a higher level with no gaping and with a markedly smaller outlet, and it is in these cases that our most gratifying results have been observed.

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## CONCERNING THE TECHNIC OF THE CLASSICAL CESAREAN SECTION

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**I**N considering the numerous methods of performing the classical cesarean operation and the present astoundingly enlarged field of its application the danger of distant sequelae that are not often thought of when operating, must be reckoned with, including disturbances due to adhesions and rupture of the uterus in subsequent spontaneous labors.

The technic here described was devised for the purpose and in the hope of avoiding these sequelae. It was thought, if a technic could be developed which would decrease the length of incisions, perfect the union of the incised musculature of the uterus, and eliminate or diminish adhesions, then with correct selection of cases and changes in postoperative handling these dangers might be mitigated.

Experiments in technic were made in 1919 using that then employed by William E. Parke as a starting point. Parke and others

then employed the high-low incision and a three tier closure of the uterus, approximating the uterine reflexion of the peritoneum by means of an exposed mattress suture. After a variety of experiments throughout 1919, the technic here reported was devised and has been employed continuously since then, whenever the classical cesarean operation was performed, except when a hysterectomy was required. It differs from that employed by Parke then and also I think from all present methods in that there has been adopted:

1. Various mechanical and technical means to: (a) accentuate the high-low principle; (b) shorten all incisions.

2. A method of closing the uterus and all serous surfaces without any exposed sutures or knots.

3. A principle of selection of cases, that while not strictly technical is yet a means of insuring better healing. The principle of selection is that which I advocated in 1915,<sup>1</sup> viz., (a) absence of repeated vaginal examinations; (b) absence of one vaginal examination unless the technic of the examiner is known to me to be satisfactory. In my own service, rectal examinations are required, vaginals prohibited, unless the first assistant performs them; (c) unruptured or recently ruptured membranes; (d) absence of any operative effort to effect delivery.

4. Changes in postoperative handling involving: (a) combatting acidosis, routinely and immediately; (b) combatting anemia, when present, by transfusion, preferably of uncitrated blood; (c) early feeding; (d) bed for twenty-one days to avoid disturbance in involution.

#### PERSONAL TECHNIC

The patient being in the Trendelenburg position, the technic is as follows:

##### 1. *The Abdominal Incision.*

*Skin.*—Midline, three-fourths above, one-fourth below the umbilicus, passing the latter to the side in an obtuse angle. Distance between the upper and lower points of the incision, connected by a straight line, about 8 cm.; length of each leg of the angle about 3 cm.

*Fascia.*—In the same manner as the skin, after which the umbilicus retracts spontaneously, and the incision becomes almost a straight line, adding 4 to 5 cm. to its length.

*Recti.*—Separated by dissection.

*Peritoneum.*—Opened in the usual manner for not more than 10 cm. The abdomen is walled off with gauze, the uterus oriented to the incision and held firmly through the abdominal wall. Retractor in lower end of incision.

##### 2. *The Uterine Incision.*—The upper limit of the incision in the uterus is located at a point that corresponds to the midpoint in the incision of the parietal peritoneum. It is carried down not more than 10 cm.

3. *Extraction of the Infant.*—The operator extracts it as far as the buttock, when the feet wrapped in a hot pad are taken by the first assistant and held perpendicularly, while the operator delivers one shoulder and then the other as in version, and then the head by the Prague method, because the incision is too short to allow of the easy extraction of the child. In the meantime the cord is clamped and cut by the first and second assistants. The placenta is removed manually and any remnants of the membranes with gauze.

4. *Closure of the Uterus.*—The uterus being delivered and resting on warm pads and clean towels, the incision is closed in three tiers as follows:

First tier.—Unites the deepest part of the incision, throughout its length, embracing one-half of the depth of the incision, excluding *decidua*. Interrupted sutures, six to seven in number, of No. 4, forty-day chromic catgut. The first, middle and last sutures are not cut at this time for they serve as tractors.

Second tier.—Unites the remaining or upper half of the depth of the incision, throughout its length, *excluding* the peritoneum. A continuous suture of the No. 4, forty-day chromic catgut is employed. Each bite of the needle enters the musculature just below the subserous margin and leaves that side just below the level of the knots of the underlying layer of sutures, reversing this course on the other side. When this tier is completed, the incision in the musculature of the uterus is closed, and the peritoneal covering lies almost in apposition except in the midportion.

Third tier.—Unites the peritoneum covering the uterus in such a manner that suture and knots are invisible. A subserous continuous suture is employed, as in a subcuticular method, of No. 1 plain catgut. The first stitch sweeps in a rather large circle underneath the peritoneum at one end of the incision, entering at one incised edge and emerging from the other. When drawn taut and tied, the knot will retract under the peritoneum. This stitch is made with a curved needle, which is now replaced by a straight skin needle. The procedure is as in a subcuticular, the second and third stitches embracing small bites; thereafter the bites may be of the usual length until one reaches a point about one inch from the other end of the incision, when the small bites should be resumed. When one approaches the last bite, the curved needle should be resumed, and should describe a large circle beneath the intact peritoneum, the suture now being doubled. When this is drawn taut and tied, the knot will be retracted under the peritoneum as the puckers in the latter smooth themselves out when the tension is relaxed. Thus the entire peritoneal surface is closed without exposed knots or sutures.

5. *Closure of the Abdominal Incision.*—The parietal peritoneum is closed by a Lembert suture in which No. 1 plain catgut is employed, leaving no exposed sutures or knots. The fascia is closed by the Noble method. The skin incision, which is extremely short, is closed by a subcuticular of No. 1 plain catgut and is reinforced by two or three stay sutures of silkworm-gut.

#### ADVANTAGES OF THIS TECHNIC

1. Lessens the tendency to the formation of adhesions. This advantage is due to:

- (a) The short abdominal incision and its position.
- (b) The short uterine incision and its position relative to the abdominal incision.

## ANALYSIS OF CESAREANS PERFORMED FROM 1921-1924 ACCORDING TO THE METHOD DESCRIBED HERE

	CONTRACTED PELVIS	PLACENTA PREVIA	ABRUPTIO PLACENTA	NEPHRITIS	SUMMARY	
Performed for	19	7	2	2	30	
Emergency cases	9	6	1	1	17	
Clinic cases	10	1	1	1	13	
<i>Deaths</i>						
Total	1	0	1	1	3	
Emergency	1	0	1	0	2	
Clinic	0	0	0	1	1	
Causes of death:						
Gonorrheal peritonitis Condition masked on admission }	1	0	0	0	1	
Hepatitis	0	0	1	0	1	
Chronic nephritis	0	0	0	1	1	
<i>Lived</i>						
Total	18	7	1	1	27	
Emergency	8	6	0	1	15	
Clinic	10	1	1	0	12	
Morbidity T. 99° P. 90 Thrice in suc- cession	{ Less than 72 hrs.	8	1	1	0	10
	{ 72 hrs. or more	5	0	1	2	8
	{ in 1921	4 in 5	1 in 3	none	1 in 1	
	{ in 1924	0 in 6	0 in 2	1 in 2	none	
Involution	{ Regular	14	6	1	1	22
	{ Symph. by 21 days	17	4	1	0	22
	{ Complete in 6 weeks.	7	7	1	1	16
Adhesions Present	{ After 6 mos.	0	0	0	0	0
	{ After 2 yrs.	1	0	0	0	1
	{ After 3 yrs.	0	0	0	0	0
Safe subsequent Labor without Cesarean, known }		3	4	0	0	7
Subsequent Record Unknown	15	3	0	1	19	



Factors (a) and (b) insure that forty-eight hours after operation, the fundus of the uterus will be at the level and often below the level of the lower margin of the abdominal incision, for the lower margin of the abdominal incision is never more than two finger breadths below the umbilicus and usually less. This situation of itself will decrease the tendency for adhesions to form between the incisions.

- (c) The method of closing the incision in the uterus especially that in the serous coat. This tends to prevent adhesion formation between this incised surface and the abdominal wall, and between it and the omentum or intestines as there are no exposed sutures or knots.
- (d) The method of closing the parietal peritoneum. This acts as does factor (c).

## 2. Rapid Involution, due to:

- (a) Absence of massive adhesions and decrease in formation of any adhesions.
- (b) Short incision in uterus lessening the area of round-cell infiltration, reactions due to trauma, sutures *in situ*, and other phenomena of healing.
- (c) Selection of cases, all clean, none even suspicious. This is considered an important condition for the employment of this technic or indeed for the employment of any of the modifications of the classical cesarean, because infection of the uterus, whether frank or potential, exhaustion due to long labor, or anemia, shock and collapse will inhibit wound healing resulting in subinvolution even if they do not cause more immediately serious trouble.

## 3. Decreased tendency to shock, collapse and peritonitis. This advantage is due to:

- (a) Decrease in exposure of the abdomen.
- (b) Short incisions.
- (c) Smooth, serous surfaces.
- (d) Selection.

## DISADVANTAGES OF THE TECHNIC

- 1. Length of operating time is increased. Time consumed 45 to 60 minutes.
- 2. High abdominal incision makes it difficult to undertake through it, any other operation in the pelvis or lower abdomen; for instance, a hysterectomy.
- 3. The short incision in the uterus makes it difficult to extract the baby unless the procedure advocated is employed, and increases the time required to extract the baby.

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## ETHYLENE-OXYGEN IN OBSTETRICS

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ETHYLENE is gaining rapidly in favor as an anesthetic and bids fair to supplant nitrous oxide in many fields of surgery. It possesses practically all the advantages of the latter, including almost complete freedom from toxicity, ease and rapidity of induction, quick recovery with a minimum of nausea, etc. It is superior to nitrous oxide in that it affords a much greater degree of relaxation, and furthermore it can be employed with a higher percentage of oxygen, so that the cyanosis so often seen with nitrous oxide-oxygen anesthesia is absent when using ethylene. The only unfavorable feature is the inflammability of the latter gas when mixed with oxygen, and the consequent possibility of explosions, several of which have been reported. By observing the precautions set forth by Luckhart,<sup>1</sup> this source of worry can be eliminated. The odor of the gas is a trifle unpleasant, but I have not heard the patients complain of it.

Possessing as it does these various advantages, it can be seen that the range of applicability of ethylene is greater than that of nitrous oxide, and hence it can be employed in surgery in cases in which the latter is generally considered unsuitable. Many surgeons who found abdominal work difficult or impossible under nitrous oxide-oxygen anesthesia are doing this type of work very satisfactorily under the ethylene-oxygen mixture, even though the relaxation is not so thorough as with ether. Naturally, this agent has also been employed in obstetrics, but only a few reports of the results in this field have been published, so that a brief review of a small series of cases in which it has been administered may be of interest.

I have employed ethylene-oxygen in a series of normal deliveries and have found that the analgesia is much more satisfactory than that obtained in delivery under nitrous oxide-oxygen, and hence that the cases progress more smoothly. Furthermore, I have observed that the analgesia obtained from the use of ethylene-oxygen is superior to that obtained when employing ether, as it is more quickly established and is more easily maintained at the proper level. My experience is that a satisfactory obstetric stage of analgesia is hard to obtain and to maintain with ether. The patient usually receives either too little anesthetic, with practically no relief from her suffering, or too much, with a resultant slowing of the labor. This prolongation of labor may also occur under ethylene-oxygen, especially toward the

end of the second stage, and care may be necessary in order to avoid it. I have not noted, either in normal or in operative cases, any undue tendency to postpartum hemorrhage; one patient bled rather profusely, but not to an alarming extent. Some of our local colleagues, however, feel that there is more relaxation of the uterus than they would wish, with freer bleeding than is normal. It is probable that such occurrences are merely coincidences.

The anesthetic may be begun as soon as the pains begin to be severe and the cervix shows some dilatation. It can be administered for several hours without apparent deleterious effects upon mother or child. In one of the normal cases of this series, the gas was given over a period of four hours, using the intermittent method to be described, which, of course, is the method employed in administering any inhalation anesthetic to a normal obstetric case. The mask is applied as soon as the contractions begin and the patient is instructed to take three deep inhalations and then to hold her breath; in the second stage, she is instructed to bear down, and as a rule she obeys readily. At the beginning of the administration, a mixture of 80 to 90 per cent ethylene with 20 to 10 per cent oxygen is used; later, the percentage of ethylene is decreased to 50 to 70 per cent. In one of my cases satisfactory analgesia was obtained with a mixture of 40 per cent ethylene with 60 per cent oxygen. The patient is carried along on a mixture as weak as is consistent with satisfactory results until the latter part of the second stage is reached, when it is generally necessary to increase the percentage of ethylene. The patient experiences great relief from the pains, and rests quietly between them, but does not lose consciousness except during the stage of expulsion, if the administration is properly performed. The addition of ether is not necessary during the expulsion of the presenting part, nor is it needed during the repair of lacerations or of episiotomy wounds. The needed relaxation can be obtained quickly by deepening the anesthesia through an increase of the ethylene percentage.

In the field of operative obstetrics, my experience with ethylene has been limited to a few cases of low forceps, the insertion of bags on two occasions, and two abdominal cesarean sections. In one low forceps case it was necessary to add a little ether; all the other operations were performed with ethylene-oxygen alone. One bag was introduced because of deficient dilatation of a cicatricial cervix in a multipara, the other was used to induce labor in an eclamptic. The two cesarean sections were performed in the obstetric service of Dr. C. Jeff Miller at the Charity Hospital. One case was operated upon by Dr. A. H. Gladden, Jr., the patient being a primipara with a badly decompensated heart lesion; the other operation was performed by Dr. Miller in a case of contracted pelvis after the test of labor had proved ineffectual. Relaxation was satisfactory in both instances; the first

operation was of the classical type, the second was a low section according to the Beck Method. Both babies breathed promptly, more readily than is the rule in cesarean section under ether. This may have been simply a matter of coincidence in these cases, however.

As in the case of nitrous oxide, best results are obtained when the anesthetic is administered by a professional anesthetist, as was done in the cases here reported. If the anesthetist is not familiar with ethylene and with the apparatus, ether is much to be preferred. Needless to state, great care must be exercised in order to avoid an explosion, even going to the extent, if necessary, of employing a specially constructed apparatus. It is possible that a court might deal harshly with the physician in case of suit resulting from such an occurrence, as the inflammability of the ethylene-oxygen mixture is a matter of common knowledge among the members of the medical profession.

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<sup>2</sup>Heaney, N. S.: AM. JOUR. OBST. AND GYNEC., 1924, viii, No. 4, 416-419.

731 MAISON BLANCHE BLDG.

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### CHRONIC INFECTIONS IN PREGNANCY\*

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IN the study of the subject of chronic infections in obstetrics made in this paper, the records of 600 private cases with complete general histories and physical examinations have been reviewed and analyzed with regard to the incidence of such infections as revealed by examination and how these affect and are affected by pregnancy. The mouth and throat were examined by a good light and the chest bared for examination in every case. The kidneys were examined by hammer-percussion and palpation, and every two weeks, a microscopic and chemical examination of the urine was made.

#### PERIDONTAL, TONSILLAR, AND SINUS INFECTIONS

These infections seem to be the most important from the standpoint of their effects upon pregnancy. Under the double burden imposed upon the liver and kidneys by bacteria and their toxins from focal infections and pregnancy, it is not difficult to understand why we more often witness their functional breakdown as manifested by the toxemias of early and late pregnancy. The etiologic relationship of these

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\*Thesis for admission to Fellowship in the American Association of Obstetricians, Gynecologists and Abdominal Surgeons.

infections to the toxemias of pregnancy has been noted by La Vake,<sup>1</sup> Mosher,<sup>2</sup> Talbot,<sup>3</sup> myself,<sup>4</sup> and others. The well-established fact that from such infections bacteria will from time to time invade the maternal blood stream will explain the greater danger among these patients of placental infection, detachment, and hemorrhage; bacterial invasion of the fetal blood stream; and puerperal infection.

The examination for infected tonsils included routine inquiry as to previous attacks of tonsillitis, or of articular or muscular pain, and notation as to redness and swelling of tonsils, exudates, raggedness, adhesions, redness of pillars, pus expressible, and enlargement of adjacent lymphatic glands. Infected tonsils were diagnosed in 166, or  $27\frac{2}{3}$  per cent, of the 600 cases. There were associated peridental infection in 39 cases; pyelitis in 24 cases, peridental infection and pyelitis in 12 cases and sinusitis in 2 cases. Van Valzah<sup>5</sup> found the incidence of infected tonsils among more than 5000 students examined at the University of Minnesota to be 42 per cent.

Examination for peridental infection included routine inquiry for a history of soreness of teeth and notation of discolored teeth, fillings, crowns, bridge attachments, pegs, redness and swelling of gums, recession of gums, pus exuding or expressible, sinuses, and enlargement of lymphatic glands.

Since approximately 80 per cent of dead teeth show apical abscesses<sup>6</sup> and 70 per cent of all treated teeth are septic,<sup>7</sup> x-ray examination of all treated teeth areas in addition to, but not as a substitute for, the examination indicated would undoubtedly reveal many cases of peridental infection otherwise not diagnosed.

There were 140 cases, or  $23\frac{1}{3}$  per cent, diagnosed peridental infection. Of these 39 cases were associated with infected tonsils, 18 with pyelitis, 2 with sinusitis, 2 with sinusitis and infected tonsils, and 12 with infected tonsils and pyelitis.

Moorehead<sup>8</sup> found the incidence of chronic mouth lesions in 700 cases to range from 69 per cent to 80 per cent according to age period.

Recently my search for sinus infections has included routine inquiry as to chronic nasal discharge, pain in sinus regions worse of mornings and on bending over, and eye symptoms not relieved by proper glasses; pressure over sinus regions for tenderness; and transillumination. Previously there was practically no search for sinus infection except of patients volunteering the history of such infection. Only seven of my 600 cases have a diagnosis of sinus infection. This probably does not represent even approximately the number actually present.

A diagnosis of infected tonsils, peridental infection, and sinusitis either alone or combined was made in 256, or  $42\frac{2}{3}$  per cent, of my cases. For convenience we will designate them as focal infections, the term in this paper not applying to infections elsewhere. A study was made of the cases of toxemia of pregnancy and of premature

termination of pregnancy as to their association or not with these focal infections.

Of the 600 cases there were 16 cases of excessive vomiting of pregnancy. Twelve, or 75 per cent, of these were associated with focal infection. The remaining four were apparently all cases of reflex vomiting—one associated with retroversion of the uterus, one with a septate uterus, one with hydramnios, and one with chronic appendicitis and cholecystitis. There were 29 cases of toxemia of late pregnancy every one of which was associated with demonstrable focal infection.

There were 30 cases of threatened premature termination of pregnancy, 24, or 80 per cent, of which were associated with focal infection. Of the six other cases, one had the record of a dead tooth and one a record of "tonsils red, anterior pillars injected." There was one case with a septate uterus and one with retroversion of the uterus.

Of actual premature terminations there were 14 cases of which 10, or 71 per cent, were associated with focal infection. Of the remaining four, two were luetic and one associated with old deep lacerations of the cervix and perineum.

In other words among the cases of focal infection constituting 42 $\frac{2}{3}$  per cent of these 600 cases, were found 75 per cent of the cases of excessive vomiting, all of the cases of late toxemia, and 80 per cent of the threatened and 71 per cent of the actual premature terminations of pregnancy.

#### PYELITIS

Like tuberculosis, pyelitis is frequently a mild, chronic disease with a tendency toward exacerbations. It is too often undiagnosed except in its severe form and even then mistakes are not infrequent. So often is it mistaken for appendicitis that some one has listed the McBurney scar among the physical signs of pyelitis.

Pregnancy predisposes to the development of pyelitis and to the exacerbation of a pyelitis already present. Abundant reason can be seen for this clinical fact when we recall that pressure on the ureters by the gravid uterus produces a degree of hydronephrosis; the stagnant urine affords a good culture medium for bacteria and tiny breaks in the overstretched mucosa afford the points of lowered resistance to further bacterial invasion; pressure against the intestines particularly at the pelvic brim increases intestinal stasis and the amount of toxins and bacteria from that source; toxins due to the pregnancy *per se* add to the kidney irritation. These things, especially in cases of existing infection and damaged kidney pelvis are likely to result in further permanent damage and, in some cases, in pyonephrosis which may necessitate nephrectomy or cause the death of the patient. The only finding which is constant in some cases is tenderness on

hammer-percussion over the kidney region and on pressure in the costo-vertebral angle on the affected side. Frequent urination, with pus and bacteria, aching in the lumbar region, marked increase in white blood corpuscles in the urine with clumping at times and bacteria are conditions that come and go. Severe pain in the kidney region, high fever, chills, sweats, and much pus in the urine are found only in the more severe cases which are comparatively rare. If these symptoms are not relieved by drainage such as is afforded by a ureteral catheter passed beyond the ureteral obstruction at the brim of the pelvis, pyonephrosis should be suspected and nephrectomy considered.

Opitz<sup>9</sup> gives the frequency of pyelitis in pregnancy as 7 per cent. In my opinion a careful search for the early symptoms and signs in every case of pregnancy will reveal a much higher percentage.

Among my cases, pyelitis was diagnosed in 84, or 14 per cent.

#### TUBERCULOSIS

Fortunately our conception of tuberculosis has been considerably clarified in recent years. We know that tubercular infection is practically universal. It is so curable that most cases get well without any treatment, the individual not even being aware of the existence of the infection. A rather high percentage of cases will have a mild, low-grade infection continuing for months or years. In this state the condition may be diagnosed only by a careful history and physical examination. With a proper hygienic routine these cases will get well. Undiagnosed and untreated, many cases, as a result of circumstances which draw too heavily upon the patient's reserve, will develop advanced tuberculosis with a fatal termination.

*Effect of Pregnancy upon Tuberculosis.*—Unless the nausea and vomiting becomes troublesome, which is rarely the case in properly supervised pregnancy, there is little cause for any unfavorable effect during the course of pregnancy if the patient takes the required amount of rest, fresh air, and proper food. The shock of prolonged pain and dread of pain and of trauma; the prolonged physical exertion; the loss of blood incident to labor and the puerperium, and finally, the prolonged drain upon the constitution incident to lactation and the anxiety and loss of sleep in caring for the baby represent a draught upon the reserve of the patient that too often means her undoing. There is a reason for the old saying, not literally true, that "confinement is likely to run into consumption." The frequency of the history of the beginning of symptoms during the puerperium has been noted by different writers. Most of these cases are evidently mild chronic cases which flare up into pronounced activity at this time. Writers generally agree that the tuberculous process is made worse in a high percentage of both latent and active cases, the percentage of exacerbation being given at from 35 per cent to 75 per

cent of cases. I believe this percentage is overestimated. It is perhaps not too high in the cases of tuberculosis with fever, râles and progressive loss of weight but is certainly much higher than should be expected in carefully supervised cases, particularly if we include those cases less acutely ill. Trussenbrock,<sup>10</sup> studying this question as presented in the population of Amsterdam and other Dutch cities, stated that the mortality from tuberculosis was increased during the first half of pregnancy and diminished during the last half, the two being practically balanced; that the mortality during the year following pregnancy is equal to that of the general mortality in adult women; and that among married women the mortality seemed to be reduced. Likewise Cornet's<sup>11</sup> statistics of mortality from pulmonary tuberculosis in Prussia showed that while the mortality under 20 was 1.76 males against 1.98 females per thousand, after 20 the proportion was practically reversed, being 3.46 males and 2.91 females per thousand.

*Effect of Tuberculosis upon the Child.*—Infection of the child *in utero* is so rare as to be of negligible importance. The great danger of infection in the child is after birth. Children are much more susceptible to infection than adults. Practically all children of mothers with open tuberculosis are infected unless strict measures are taken to prevent it. The mortality among these children is said to be from 50 per cent to 60 per cent due largely to artificial feeding and to neglect on account of disability or death of the mother.

As to the frequency of active pulmonary tuberculosis, there is a wide variation in opinion. Autopsies show that between the ages of 20 and 40 the incidence of active lesions is from 50 per cent to 75 per cent according to age.<sup>12</sup> Dickinson<sup>13</sup> says that one adult in six has active tuberculosis. Bacon<sup>14</sup> states that from 1 per cent to 1½ per cent of women who become pregnant have pulmonary tuberculosis which can be diagnosed if careful examination is made. The discrepancy evidently depends upon whether or not is included that large number of people with active lesions who are usually not considered ill but who present very definite evidence of a chronic low-grade pulmonary tuberculosis if we but look carefully for that evidence. The patient who tires easily; is underweight; with temperature variable but below normal; rapid pulse; low blood pressure; dilated pupils; pale mucous membranes; prominent sternomastoid; and signs of fibrosis in the lungs even in the absence of fever, cough, progressive loss of weight, and râles should be considered probably tuberculous. There has been nothing more gratifying than the almost unfailing permanent improvement in the general health of these sub-normal patients following the institution of rest with plenty of food and fresh air.



Ninety-six, or 16 per cent, of my cases were diagnosed probably pulmonary tuberculosis although in only 18, or 3 per cent, were râles present. One patient in this series had a therapeutic abortion and the operation was performed in two cases not in this series on account of incomplete records. One patient developed pyonephrosis requiring nephrectomy at the seventh month. She died of tuberculosis within three months after the premature labor which followed the nephrectomy. All cases seen and treated antepartum, except this one showed no exacerbation and, almost without exception, were permanently improved in health.

#### SYPHILIS

Of 705 fetal deaths in 10,000 deliveries at Johns Hopkins Hospital, Williams<sup>15</sup> reported that 26 per cent were due to syphilis. Various authors give the frequency of syphilis in pregnancy at from 3 per cent to 16 per cent. The clinical evidence of syphilis, is unreliable and the Wassermann reaction is the test by which the diagnosis must generally be made.

Routine Wassermann was made in 265 of my cases, with 3 positives. Of these three, one was a premature labor. The baby was apparently normal otherwise, but was referred for pediatric care. The other two appeared normal but were likewise referred to a pediatrician. Three other cases presented clinical evidence of syphilis with negative Wassermans. All had been under the care of syphilologists by whom the cases were referred to me. One had a premature stillbirth due to placental apoplexy; the others gave birth to apparently healthy babies.

Sixty-nine cases, or 11.5 per cent, had a diagnosis of cervicitis. Specular examination was not made as a routine but only in cases complaining of leucorrhea or sacral or lower abdominal pain. Cholecystitis was diagnosed in 28 cases and appendicitis in 20 cases.

Talbot has suggested that chronic infections may be a cause of fetal malformations and of hemorrhagic condition of the newborn. Among my cases there have been only one case of hemorrhagic condition of the newborn and three cases of fetal malformations. In the case of hemorrhagic condition of the newborn the mother had a peridental abscess. In a case of malformation of the lungs revealed at autopsy the mother had peridental and tonsillar infection. In a case of cleft-palate and harelip the mother had pyorrhea and pyelitis. The mother of an anencephalic monster also had pyorrhea and pyelitis. All four of these mothers had negative Wassermans and no clinical evidence of syphilis.

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101 E. SEVENTH STREET.

## OBSERVATIONS ON THE RUBIN TEST\*

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### INTRODUCTORY

**D**URING a period of approximately three years which have elapsed since we began the study of fallopian tubes by the Rubin method in the Gynecological Department of the Jefferson Hospital, about 350 cases have been examined. While we realize that this is a comparatively small number as contrasted with the experience of many others, certain observations as to apparatus, technic and findings seem well worth noting.

There can no longer be any question as to the practicability of the Rubin test; that it is reasonably safe is demonstrated through the mass of statistics which has accumulated.

Since we regard the apparatus used as an important factor, if one is to avoid fallacious interpretation of results, a moment will be devoted to its description.

### APPARATUS

Essentially it is the same as that originally described by Rubin and manufactured by E. Machlett and Company, of New York.

We early recognized the cumbersome nature and the nonportable feature of such an apparatus, so a syringe fitted with an air filter was designed by Dr. Heineberg, using the ordinary Tycos manometer with a stabilizing small rubber bag. Results with this, although useful, came to be regarded as not exactly accurate since neither rate of flow nor pressure could be perfectly regulated and we have come to regard these two features as most important if one is to avoid fallacies in his interpretations.

Since the presence or absence of the pneumoperitoneal pain reflex is so valuable a check of findings, the attempt is made to produce a

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mild one in each case. The matter of gas selection is, therefore, of importance; the absorption of oxygen is slow probably about two hours; air on account of its nitrogen content is apt to produce some rather prolonged pain. With carbon dioxide gas one can say to the patient that any discomfort will disappear in a matter of fifteen to twenty minutes. No patient has complained of more than transient discomfort and has been inclined to disregard it when reassured concerning its cause.

#### TECHNIC

Our reducing valve set at 4.5 lbs. will register a maximum of 200 mm. on the manometer; this is tested out prior to each case. The rate of flow is so adjusted that a pressure of 100 mm. will accumulate in 20 seconds; this is extremely important, errors in the technic here undoubtedly being accountable for many of the relatively high pressure findings in normal patulous tubes. It is evident that if gas is forced into the uterus at a higher rate than it can be passed by the tubes, the pressure must rise in the manometer even though the tubes are patulous, and we may easily consider such tubes as occluded or classify them as showing unilateral occlusion or as being pathologic though patent.

Practically all our cases have been done in the hospital, surrounded with all the preparation (except for anesthetic) accorded a dilatation and curettage, the lithotomy position, a Graves' bivalve speculum to expose the cervix whose anterior lip is grasped crosswise with a double tenaculum, and the external os and canal then painted with 3.5 per cent iodine.

It is our custom to always precede the insertion of the cannula with the uterine sound, this to determine exactly the direction of the uterine canal and slightly dilate it. Two failures can be attributed to nonobservance of this detail.

The release valve is kept open until the cannula with its rubber tip is made to fit tightly into the cervical canal. The screw release valve is then closed and the manometer will begin to register pressure.

We have noted that some 60 c.c. of gas are used to raise the pressure to 200 mm. in cases of isthmial occlusion; some of this is undoubtedly taken up by compression of gas and distention of the rubber tubing. As to the size of the uterine cavity, various estimates have been made from 10 m. by Cary to 15 c.c. in a postmortem uterus examined by Rubin and 10 to 20 c.c. shown by Peterson on x-ray. These two latter observations were made on the relaxed uterus. We believe that this condition of relaxation so often noted during curettage exists with the uterine cannula in place and that the capacity of the uterus varies during the course of a Rubin test to as high as 20

c.c. at least and that some fluctuations of pressure are directly the result of the condition of the uterine muscle.

Large abdominal tumors may be considered a contraindication but we have used transuterine pneumoperitoneum as an aid to x-ray in the diagnosis of splenic, renal and retroperitoneal tumors with no unfavorable results.

#### UNFAVORABLE RESULTS

No unfavorable results of serious consequence have been noted. One of the early cases, before fluoroscopic examination was considered unnecessary and when larger quantities of gas were used, suffered rather severe shock. This was a thin, asthenic woman with advanced myocarditis.

Sellheim cites a case of air embolism, and suggests that an oiled catheter be used.

Possibilities of the interruption of pregnancy are real although Peterson and Cron report two cases of women six to eight weeks' pregnant, on whom, as a result of mistaken diagnosis, the Rubin test was carried out. In neither of them was pregnancy interrupted and both went on to normal full term delivery. Undoubtedly there have been similar cases, credit for the termination of whose sterility has been attributed to the Rubin test itself.

Two cases of pneumosalpinx have been brought to our attention, one operated immediately upon discovery of the mass, and the other producing pain but subsiding in the course of a short time. It is our custom now to carefully examine each case after the test.

As to inflammatory reaction, this has practically been absent. The precautions in inflammatory cases have already been mentioned.

#### INTERPRETATION OF RESULTS

In the interpretation of results it is obvious that there can be but two main premises; either gas does or does not pass through the tubes. But experience, particularly that associated with operative findings, has taught us that gas may not pass in cases where no tubal pathology exists and conversely that gas may pass in cases where the tubes can certainly be regarded as functionally occluded.

It is further obvious that upon difference in technic, for example, type of apparatus used and rate of gas flow, will come other variations of interpretation.

Some observation on particular types of cases must be introduced at this point in order to show their influence upon Rubin findings.

For instance, a series of retrodisplacements was studied and an attempt made to differentiate those complicated by tubal inflammation. Some that we regarded as simple retrodisplacements, which with the Rubin test showed evidence of definite, partial or complete

occlusion, went to operation, which did not reveal any evidence of tubal pathology on inspection and by Curtis' method were found patulous. This led us to adopt another procedure; those uncomplicated backward displacements which showed Rubin evidences of any occlusion were treated by replacement of the uterus and a pessary. After an interval, another Rubin test was done. Of sixteen cases so handled, thirteen were positive (that is, gas passed) on reexamination, one on the second reexamination and two are still occluded. We, therefore, believe that either the congestion or kinking of the tubes incident to retrodisplacement can lead to tubal occlusion and sterility.

A small series of pathologic antelexions were studied. All these showed slightly higher manometer readings than we have come to regard as normal; this we concluded to be the result of tubal maldevelopment.

One case with uterus in normal position and no tubal pathology palpable showed definite occlusion on test; at operation the uterus was found to show endometrial hypertrophy but no tubal pathology. We, therefore, feel that this well illustrates the erroneous conclusions which might be reached near the menstrual period. The remedy is obvious; those cases with uteri in normal position, freely movable, and with no tubal pathology that is palpable, should be reexamined before definitely deciding that their tubes are occluded.

Importance of the rate of flow has already been mentioned; if it is higher into the uterus than is possible through the tubes, the manometer reading must rise and a conclusion of either partial or complete occlusion be reached.

A high initial pressure with sudden fall has been noted by many observers. In many instances this has been taken as indicating the dislodgment of some occlusion or the separation of obstructing adhesions. Peterson observes that in the microscopic examination of some thousands of tubes no "mucous plug" has ever been observed. It seems to us that those variations of muscle tonus observed in curettage might reasonably be responsible for some.

We believe that normal tubes in the absence of any other pelvic pathology will not offer a resistance greater than 40 to 80 mm. of mercury; that at 200 to 220 mm., no extra tubal condition such as a retrodisplacement, premenstrual congestion, etc., being a possible cause, the tubes are occluded or absent.

Between these two readings comes, what we consider, the "doubtful group"; gas passes but at relatively high pressure. Some pathology exists; with a pressure above 150 mm. we regard the tubes as functionally occluded.

The attempt has been made to definitely locate the site of occlusion. Patients insist upon a prognosis especially when operation is considered and it is upon determination of the site to a great extent that

it must be based. Undoubtedly, the most common cause of complete tubal obstruction is due to occlusion of the fimbriated extremities. In the microscopic examination of some thousands of tubes in the Pathological Laboratory of the University of Michigan, no case of complete closure of the tubes except at the fimbriated extremity has been noted. The interstitial portion may be narrowed by fibrous tissue proliferation of the submucosa and muscularis, the condition being an obstruction rather than atresia. Be this as it may, the interstitial portion may act as an obstruction to the passage of gas below the point at which danger of tubal rupture is certain.

We have taken bilateral lower abdominal pain as indicating bilateral fimbrial obstruction; unilateral pain with a passage of gas into the abdomen at above normal pressure as indicating unilateral obstruction on the side of the pain. We have endeavored to hear the passage of gas into the abdomen with a stethoscope and so locate the patulous side with but indifferent success.

These unilateral obstructions, however, are less important since there is the possibility of conception. It is in the cases of bilateral occlusion that a definite knowledge as to the site is essential for operative prognosis, and it is here that we consider radiography of the fallopian tubes, using 20 per cent sodium bromide solution, as being safe and the final word in a complete diagnosis.

#### DIFFICULTIES ENCOUNTERED

In two cases of acute antelexion it was impossible to introduce the cannula. With the routine introduction of a uterine sound prior to the cannula this difficulty has been obviated.

Nervous patients have been the most difficult to handle; these, however, can usually be reassured and we are frank in telling them that they will have slight discomfort but no pain. This type of case, however, is apt to give misleading information from the test since they hold themselves rigid, thereby increasing intraabdominal pressure and raising the manometer reading.

The irregular cervix has presented a problem in that it is difficult to render air-tight. However, by inclining the cannula one way or the other, a point is usually found where an interpretable intrauterine pressure is possible. The presence or absence of the shoulder pain reflex in these cases is of diagnostic value.

#### VALUE OF TEST

There are two phases, diagnostic and therapeutic. Its use in the diagnosis of sterility is most important; however, it is an aid in the differentiation of confusing pelvic masses, as a test of sterilization following such an operation and as an aid to x-ray through trans-uterine pneumoperitoneum.

It is an aid to conservative surgery in inflammatory cases in pointing out that one tube is patulous and may be left; or again in the case of a fibroid, in showing that one or both tubes are patulous and thus making myomectomy, where practicable, rather than hysterectomy, the operation of choice in a woman of child-bearing age. We have further used the test as an aid in the differential diagnosis of lower abdominal pain in cases where no definite pelvic pathology was bimanually demonstrable.

#### STATISTICS

The matter of selection of cases and group classification of findings will to a great extent predetermine statistics. Our series contains a relatively high number of inflammatory cases with more or less marked palpable pelvic pathology, this in the attempt to estimate the extent of tubal involvement or aid in the diagnosis of lower abdominal symptoms.

We early classified our cases according to the levels of pressure suggested by Rubin. That is:

1. If gas passed at a pressure below 150 mm. the tubes were considered patent.
2. If a pressure of 150 mm. or more was required before gas passed the tubes were classified as partially occluded.
3. Readings above 200 mm. were considered as indicating occluded tubes..

On this basis, 150 or 42.3 per cent of our cases were occluded, 12 or but 3.4 per cent were doubtful, and 192 or 54.2 per cent patulous. We have taken as our reading in all instances the lowest pressure at which gas passed.

We found however that in the so-called patulous group were a number of cases which on pelvic examination showed palpable pathology, and cases which came to operation demanding unilateral or even bilateral salpingectomy.

Peterson and Cron having shown with the abdomen open, that in cases with no inflammatory history, gas passed readily at pressures usually not going above 80 mm., we adopted the suggestion of Aldridge, considering a pressure not above 100 mm. at the 20 to 100 rate of flow as indicating patent and normal tubes.

Between 100 and 200 mm. we classified the tubes as partially occluded, inclining toward the belief that between 100 and 150 mm. it might be temporary, certainly requiring further investigation.

On this basis 150 or 42.3 per cent showed tubal occlusion, 108 or 30.5 per cent partial occlusion and 96 or 27.1 per cent definitely patulous. In these latter the average low pressure was 56 mm. A total of 204 or 57.6 per cent must therefore be regarded as "Rubin Positive"; that is, gas passed through the tubes into the abdomen.

A total of fifty-seven cases went to operation, in fifty-six of which laparotomy was done. The other case had had a previous salpingectomy; the test showed the remaining tube to be occluded. Under anesthesia a backward displacement but no other pathology was noted and a dilatation and curettage done. This patient became pregnant within three months. Labor was complicated by eclampsia.

Of the fifty-six patients on whom laparotomies were performed, three showed on Rubin test normal tubes, proved so on inspection. The remainder, fifty-three cases, diagnosed as occluded or partially so, all showed gross tubal pathology on inspection with one exception. This patient had a backward displacement, no evidence of pelvic inflammation and proved patulous by Curtis' method. However a curettage showed marked endometrial hypertrophy and may have been the responsible factor.

Eight cases have reported pregnancies following the test; duration of sterility in these cases varied from three to sixteen years. Of these, five complained of absolute sterility; one forty years of age had been married sixteen years; one had had a previous salpingectomy. Two on Rubin test were classified as patulous while the other three were regarded as partially occluded.

Of the three relatively sterile cases, one had a doubtful miscarriage at four weeks, seven years previously; prior to marriage she had had a right salpingectomy. We regarded her remaining tube as absolutely occluded; her uterus was retroverted. Pregnancy followed curettage. The other two cases had had lower abdominal operations (one a salpingectomy three years before, the other appendectomy with drainage four years previously) following which they had been sterile. Both showed Rubin evidences of partial occlusion. No treatment beyond douches and general hygienic measures was given.

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(For discussion, see p. 872.)



# A STUDY OF THREE HUNDRED PREGNANT NEGRO WOMEN HAVING A FOUR-PLUS WASSERMANN\*

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**T**HIRTY per cent of the women that come to our Obstetrical Clinic have syphilis. This analysis is offered merely as a further contribution to the subject of syphilis and pregnancy.

Trying to utilize to the best advantage our almost incomparable clinical material, we have installed a laboratory directly across the hall from our delivery rooms. A full time technician is in charge. Here all placentas are being studied histologically; all stillborn babies are autopsied and the tissues prepared for histologic study, sections of the various organs are stained with silver preparations and a prolonged study is being made of the early activities of the organism of syphilis on fetal structures. A dark-field study is made of the liver from all autopsies.

We have of late been puncturing the livers of live babies, born of mothers with a four-plus Wassermann, and demonstrating by dark-field examination the spirochetes of syphilis. We are convinced that congenital syphilis can be positively diagnosed in this way when other methods fail. We will soon publish the details of some of these investigations. Unfortunately our facilities were limited when the first of these women were studied and some of the investigations are not as complete as they should be.

All of the Wassermanns were done by E. M. Berryman, to whom we are very grateful. The sheep cell system was used. The antigen used was cholesterolized alcoholic extract of beef heart.

## PREVIOUS OBSTETRIC HISTORY OF THE MULTIGRAVID WOMEN OF THIS SERIES

Of the 300 women observed, 184 had been previously pregnant. Previous stillbirths were admitted by 45 of these women, who together gave a history of 65. The greatest number occurring with any one woman was 7, with another 5 and with several there were 3. Previous premature labor was reported by 39 women. A history of 3 premature labors by one woman was not uncommon. A total of 57 occurred in these 39 women. Previous abortions occurred in 27 cases, these women reporting a total of 46 abortions. We would emphasize the fact that 111 of these women had prior pregnancies that ended disastrously 168 times.

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\*I wish to thank R. A. Bartholomew, H. Sheppard, James J. Clark and Helen Roberts for assistance in the preparation of the material for this article.

The statement that syphilis does not cause early abortion seems to be substantiated by this series of cases. There were only 13 early abortions.

#### RESULTS OF PREGNANCY OBSERVED IN THREE HUNDRED WOMEN

Fifty-six babies were premature and born dead. Thirty-one babies were premature but born alive. Eight of these premature babies died before leaving the hospital. Ten infants that went to full term were still-born. Eight apparently normal babies died during the first ten days. If we count the 13 abortions, the stillbirths and the babies that died in the hospital, pregnancy ended disastrously in 32 per cent of the cases. If we include the 23 premature babies that were discharged from the hospital, but whose early life, considering care, environment, heredity, etc., is extremely precarious, the appalling percentage of 39 is obtained. One hundred and seventy-four women went to full term and delivered apparently normal, healthy infants. We believe that the percentage of congenital syphilis in these babies would have proved very high, had liver puncture and dark-field examination been done on them.

#### BLOOD PRESSURE READINGS

We arbitrarily decided to consider as abnormal any systolic pressure of 135 and over, and any diastolic pressure of 90 and over. There were 84 such pressures, a percentage of 28. This would not indicate that syphilis was a common cause of high blood pressure during pregnancy. Some textbooks state that a systolic pressure of 150 at the time of labor is not abnormal. The daily blood pressures in our clinic will run just about the same as was observed in this series.

#### HISTORY OF SYPHILIS

George H. Noble claims from his clinical experience of the past thirty-five years, that the negro race is rapidly acquiring an immunity to syphilis. Careful study of each of these 300 records, by the author, shows only 12 cases in which a positive history of the disease was obtained. In 67 cases some evidence of syphilis was demonstrated. In some of them this evidence was rather meager and I do not believe that our statistics along this line are quite accurate.

#### PRENATAL VISITS AND TREATMENTS

Of the 300 cases, 172 visited the prenatal clinic one or more times. A great many did not return after the first visit. We have no legal way in which to compel these women to take treatment. The treatment in most of them was wholly inadequate. We are working on another series of cases in which the treatment is more satisfactory. The following few cases will serve to show at what stage of pregnancy our patients report to the clinic for examination and treatment:

2	women	applied	for	care	when	2	months	pregnant
1	woman	"	"	"	"	3	"	"
2	women	"	"	"	"	3½	"	"
2	"	"	"	"	"	4	"	"
4	"	"	"	"	"	4½	"	"
12	"	"	"	"	"	5	"	"
7	"	"	"	"	"	5½	"	"
7	"	"	"	"	"	6	"	"
7	"	"	"	"	"	6½	"	"
18	"	"	"	"	"	7	"	"
6	"	"	"	"	"	7½	"	"
12	"	"	"	"	"	8	"	"
8	"	"	"	"	"	8½	"	"
1	woman	"	"	"	"	at	term	

The prenatal therapeutics used includes the intravenous use of some arsenical preparation every two weeks. This is given in 0.3 gm. doses. We have used several different preparations and while we prefer to give neosalvarsan, we must be grateful for what we can get from a municipal clinic. In the past we gave intramuscular injections of mercury every two weeks. This nearly disrupted our clinic. The patients rarely came back after the first injection. During the past few months we have substituted mercurial inunctions. The woman is put on a table, her abdomen bared and she is given some mercurial ointment. She then rubs this in, under the direction of the obstetric interne, and until he tells her to stop. In addition all are put on protiodide of mercury and potassium iodide by mouth. During the five years that we have been running our prenatal syphilitic clinic, we have never had a reaction from the intravenous use of arsenic that in any way approached a fatality. Reactions of any kind have been few and far between and, when they do occur are mild. They can usually be traced to improper technic. A careful interne will serve his entire time on the clinic without a reaction.

#### EXAMINATION OF THE BABIES BY THE ROENTGEN RAYS

An x-ray examination was made of 74 babies for changes in the long bones that are supposed to be characteristic of congenital syphilis. Unfortunately when going over our records we made no note as to whether these babies were alive or dead. Positive evidences of syphilis were found in 12 per cent of them. As is generally stated, when these changes are found they are pathognomic of syphilis, but we believe that positive evidences will be obtained in only about 10 per cent of the babies that have congenital syphilis. We are now examining in this way all of the babies from whose livers spirochetes have been obtained, in order to establish a reliable percentage of bone changes in congenital syphilis.

#### SEROLOGIC TESTS ON THE BABIES

The cord Wassermann was done 219 times. A four-plus reaction was obtained in 50 cases or 22.8 per cent. There were four cases in which the reaction was three-plus. A Wassermann on the sinus blood was done

on 50 babies. Nine of these, or 18 per cent, showed a four-plus reaction. A spinal fluid Wassermann was done 57 times and were four-plus positive in 14 per cent of the cases.

#### MACERATION

Of the babies that were stillborn, 42 per cent were macerated. While the majority of macerated babies are syphilitic, it is because the majority of stillbirths are caused by syphilis. We believe that maceration has nothing to do with syphilis and that we should correct our teaching along this line.

#### HISTOLOGIC STUDIES OF THE PLACENTA

Microscopic studies of 86 of these placentas were made. Positive evidence of syphilis was obtained in 32 of them, or 37 per cent. Seven were doubtful but probably positive and 47 were undoubtedly negative. If we add the 7 doubtful ones, the total positives would be 45 per cent. Quite frequently the placenta of a mother who is syphilitic and who gives birth to a syphilitic baby will be plainly negative. The converse of this is true. Plass, in a personal communication, was inclined to believe that efficient prenatal treatment profoundly influences the histologic appearance of the placenta. At the present time we are not prepared to express an opinion.

#### MORTALITY

The maternal mortality was 1.6 per cent, 5 mothers in the series having died. The corrected mortality of a series of 2500 cases recently reported by us was 1.7 per cent. It would seem that syphilis has no influence upon the death rate of the mother in pregnancy and labor. The causes of death were: lobar pneumonia, lysol suicide, general peritonitis, and puerperal sepsis (two).

It is interesting to note several apparent inconsistent results in this study: There were 3 cases in which the x-ray examination of the baby was negative; the cord, spinal fluid and sinus blood Wassermann was negative and the placenta of each was definitely positive. Here was one case in which Wassermanns on the spinal fluid, sinus blood and cord were negative and the placenta and x-ray examinations both positive. In only one case were the spirochetes demonstrated in the liver, all three Wassermanns positive and the placenta positive.

As Schuman stated in a recent paper: "The mere mention of the words syphilis and childbirth in combination, brings to the mind the many fascinating problems of biology, disease transmission and antenatal therapeutics which arise when these two conditions occur simultaneously. Proteus, in form indefinite and intangible chameleon in colors changing without cessation and increasingly deceptive, a last plague from Pandora's box, a prodigy fallen from the stars, to quote the poetical

Frasicator; nowhere does the great destroyer more patently reveal its power than in the appalling death rate it imposes on the foetus." We feel we have only begun to scratch the surface in our knowledge of syphilis in pregnancy.

Our observations in the study of these three hundred pregnant syphilitic women lead us to the following conclusions:

1. Syphilis tends to the premature interruption of pregnancy.
2. Abortion induced by syphilis occurs late in pregnancy.
3. Syphilis is not a factor in the production of a hypertension during pregnancy.
4. Women can be given arsenical preparations intravenously, during pregnancy, with safety.
5. We believe that babies born of syphilitic mothers are syphilitic, and that prolonged study and work will prove them so in a great proportion of cases.
6. Syphilis in pregnancy does not increase the maternal hazard.

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## WEIGHT DURING PREGNANCY WITH OBSERVATIONS AND STATISTICS\*

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**B**LOOD pressure readings and urinalysis are considered essential in prenatal care. The condition of the patient may be determined from the results obtained from this routine. The weight of the patient recorded systematically is also vital as an index to the patient's condition.

Zangemeister's investigation on the connection between pregnancy edema, pregnancy nephritis and eclampsia shows the value of recording the patient's weight during pregnancy. Zangemeister believed that edema in the brain which caused the convulsions of eclampsia was due to the abnormal permeability of the vessel walls. Wieloch claims that the edema in the brain can be detected early by systematic weighing of the patient, and thus prevent pregnancy nephritis and eclampsia by measures which have a tendency to edema. He accomplishes this by intramuscular injections of colloidal solutions, which, he claims, combats the abnormal permeability of the capillary walls. By this means, he reduced in weight 50 per cent of seventy-five women given injections of 5 c.c. of a solution of gelatin, and 80 per cent of fifty-one women injected with 10 c.c. of a 5 per cent acacia-Ringer's solution. In giving the injections, daily or at longer intervals, Wie-

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loch was guided by the weight. The question is whether the edema is due to the abnormal permeability of the vessel walls, or to a change in the blood as a result of faulty metabolism.

Gassner found an average monthly increase for the last three months of from three and one-half to five and one-half pounds, being in proportion to the weight of the individual, and more in the multigravidae.

The loss of weight in the beginning of the puerperium is the result of the emptying of the uterus of its contents, and of the strain of delivery. Long and arduous labors will cause reduction of weight as in other physical contests. Postpartum patients on a liberal diet will not lose in weight as those on a restricted diet.

The gain in weight during pregnancy is the result of the weight of the fetus, the placenta, the amniotic fluid and the enlargement of the uterus and the mammary glands. This amounts to about fifteen pounds. For the average patient, the food and metabolism during the nonpregnant period is sufficient to answer all demands of the fetus and appendages during gestation. The amount of food taken above the demands of the body tissues and for fetal development is stored up in the body tissue as fat. Greater work is required of the heart to meet this unnecessary requirement.

The first trimester of pregnancy is characterized by lassitude, and probably a loss of weight attributable to nausea and inability to retain food, and lack of appetite. During this period, a high carbohydrate diet is efficacious in preventing vomiting of pregnancy. As nausea and vomiting disappear and the appetite increases, the carbohydrate diet should be limited, if an abnormal gain in weight is to be prevented during pregnancy. Two thousand to three thousand calories per day are sufficient to sustain the average pregnant patient.

The diet should consist of food sufficient in bulk to cause elimination, furnish vitamins required for sustenance, and reproduction. This diet includes lettuce, green vegetables, fruits, meat in moderation, and a limited amount of milk, which furnishes calcium in an excellent form.

An excessive diet of carbohydrates and fats, and low in vitamins causes intestinal stasis, provides a field for putrefaction and growth of intestinal flora, from which toxins are absorbed. These toxins cause extra work for the liver and kidneys and other vital organs. Intestinal stasis encourages lesions of the colon, and later on infection of the various organs of the body. In my opinion, this is the reason the pregnant woman frequently complains of pain in the intestinal tract, especially in the right lower quadrant, oftentimes confused with pathology of the appendix. If the patient is permitted to gain in weight and improper or poorly selected food is partaken of, lesions are formed in the tract through which parasites enter the blood stream and infect the various organs of the body.

To prevent many of the complications during pregnancy, the routine recording of the patient's weight is necessary. In my paper, "Weight During Pregnancy," read before the Section on Gynecology and Obstetrics, State Medical Association of Texas, Ft. Worth, Texas, May, 1923, I reported the incidence of weight in one hundred consecutive cases during pregnancy.

Records of weight during pregnancy made systematically each week together with blood pressure readings and frequent examinations of the urine convince me that weight is equally important with these other prophylactic measures.

I am reporting 236 cases showing weight during pregnancy with its effect upon the health of the patient. These do not include all of the cases that have been under my supervision, but will illustrate my point that the control of weight during pregnancy is of consequence. My conclusions are based upon my individual records over a period of several years.

The weight and blood pressure of these patients were recorded each week, with the exception of a few, and cover a period of six or seven months. Each case was considered individually. The relationship which existed between the standard weight of the patient and the weight at the first visit determined the course to pursue as to the loss or gain of weight during pregnancy. The standard weight which was used as a basis is one recognized by a standard life insurance company.

The average gain in weight for each patient in this series is 13 pounds and 4 ounces. There were 117 multiparae, and 119 primiparae. The average gain for the multiparae was 12 lb. and 3 oz., while in the primiparae the average gain was 14 lb. and 3 oz. Of the 117 multiparae, 103 gained in weight, and the average gain was 13 lb. and 14 oz. Of the 119 primiparae, 108 gained in weight, and the average gain was 16 lb. and 4 oz. There were 14 multiparae in this series of 236 cases who lost in weight, with an average loss of 9 lb. and 11 oz., while 11 primiparae lost in weight, with an average loss of 7 lb. and 3 oz.

There were 45 multiparae who gained 15 lb., or more, an average gain of 22 lb. and  $2\frac{1}{2}$  oz., in comparison with 57 primiparae who gained 15 lb., or more, with an average gain of 23 lb. and 8 oz.

There were 58 multiparae whose gain was less than 15 lb., with an average gain of 7 lb. and 8 oz.; while 51 primiparae whose gain was less than 15 lb. had an average gain of 8 lb. and 2 oz.

The greatest gain in any patient was 41 lb., a primipara, and the greatest gain in a multipara was 35 lb. The greatest loss was a multipara, who lost 25 lb., and the greatest loss in a primipara was 20 lb.

In this series of cases, the primipara has, by every law of averages, shown the greatest gain over the multipara. In my opinion, this is

TABLE I

NUMBER OF CASES	PARA	AVERAGE GAIN OF WEIGHT
117	1 to 6	12 lb. - 3 oz. (5.52 Kg.)
119	Primipara	14 lb. - 3 oz. (6.43 Kg.)
236		13 lb. - 3 oz. (5.975 Kg.)

TABLE II

NUMBER OF CASES WHO GAINED	PARA	AVERAGE GAIN OF WEIGHT
103	1 to 6	13 lb. - 14 oz. (6.29 Kg.)
108	Primipara	16 lb. - 4 oz. (7.37 Kg.)

TABLE III

NUMBER OF CASES WHO LOST WEIGHT	PARA	AVERAGE LOSS OF WEIGHT
14	1 to 6	9 lb. - 11 oz. (4.39 Kg.)
11	Primipara	7 lb. - 3 oz. (3.26 Kg.)

TABLE IV

NUMBER OF CASES WHO GAINED 15 LB. OR MORE	PARA	AVERAGE GAIN OF WEIGHT
45	1 to 6	22 lb. - 2½ oz. (10.05 Kg.)
57	Primipara	23 lb. - 8 oz. (10.66 Kg.)

TABLE V

NUMBER OF CASES WHO GAINED LESS THAN 15 LB.	PARA	AVERAGE GAIN OF WEIGHT
58	1 to 6	7 lb. - 8 oz. (3.4 Kg.)
51	Primipara	8 lb. - 2 oz. (3.68 Kg.)

Greatest gain in any patient was 41 lb. (18.6 Kg.), a primipara; in a multipara 35 lb. (15.87 Kg.)

Greatest loss in any patient was 25 lb. (11.34 Kg.), a multipara; in a primipara 20 lb. (9.07 Kg.)

probably on account of the fact that most of the primiparae are young, not fully developed and may be under standard weight.

In this series of cases, there were 233 babies whose weight averaged 7lb. and 13 oz. Of the 118 babies of the multiparae, the average weight was 7 lb. and 15¾ oz.; while of the 115 babies of the primiparae, the average weight was 7 lb. and 12½ oz. There were 120 males whose average weight was 7 lb. and 15 oz. and 113 females whose average weight was 7 lb. and 6 oz. Of the number of males, 59 were of multiparae, with an average weight of 8 lb. and 1 oz., as compared with 61 males of the primiparae with an average weight of 7 lb. and 14½ oz. There were 59 females of the multiparae, with an average weight of 7 lb. and 14 oz., and 54 females of the primiparae whose average weight was 7 lb. and 10½ oz. Eighteen babies weighed over 9 lb., the largest being a male whose weight was 10 lb. and 12 oz. Thirteen of the 18 babies weighing over 9 lb. were males. The above



baby which weighed 10 lb. and 12 oz. was postmature. The mother was a primipara, had symptoms of eclampsia, and refused induction of labor one month prior to delivery. Labor was normal.

A set of twins of a multipara are included in this series. A premature baby, hydrops universalis, and two anencephalic monsters were not included in the calculations.

TABLE VI  
WEIGHTS OF BABIES

NUMBER OF BABIES 233	AVERAGE WEIGHT 7 lb. - 13 oz. (3443.75 grams.)
NUMBER OF BABIES OF MULTIPARA 118	AVERAGE WEIGHT 7 lb. - 15 $\frac{3}{4}$ oz. (3617.46 grams.)
NUMBER OF BABIES OF PRIMIPARA 115	AVERAGE WEIGHT 7 lb. - 12 $\frac{1}{2}$ oz. (3529.57 grams.)
TOTAL NUMBER OF MALES 120	AVERAGE WEIGHT 7 lb. - 15 oz. (3600.45 grams)
TOTAL NUMBER OF FEMALES 113	AVERAGE WEIGHT 7 lb. - 6 oz. (3345.3 grams)
NUMBER OF MALES OF MULTIPARA 59	AVERAGE WEIGHT 8 lb. - 1 oz. (3657.15 grams)
NUMBER OF FEMALES OF MULTIPARA 59	AVERAGE WEIGHT 7 lb. - 14 oz. (3572.1 grams)
NUMBER OF MALES OF PRIMIPARA 61	AVERAGE WEIGHT 7 lb. - 14 $\frac{1}{2}$ oz. (3586.27 grams)
NUMBER OF FEMALES OF PRIMIPARAE 54	AVERAGE WEIGHT 7 lb. - 10 $\frac{1}{2}$ oz. (3472.87 grams)

Eighteen babies, 13 of which were males, weighed over 9 lb., (4082.4 grams) largest 10 lb. - 12 oz., (4876.2 grams) male.

In this number are: one set of twins, one premature not included in the calculation, and three, one of which was a hydropic fetus, and two anencephalic.

I have attempted to classify the records (Table VII) so as to show by comparison how some patients may gain in weight and others lose. The first weight given is a record of the weight of the first visit, and the next is the weight just previous to delivery. The blood pressure given is that recorded at the first and last visits. The weight and blood pressure of each patient has been recorded each week although not shown in this Table VII.

These records are practically the same as those included in the series of 236 reported, and are classified according to pathology which had previously existed in the history of the patient and of conditions which arose during pregnancy.

TABLE VII

DISEASE	AGE	PARA	HEIGHT	WEIGHT	ST. WT.	GAIN	LOSS	B. P.	URINE	BABY SEX WT.
<i>Tuberculosis</i>	19	0	5 - 9 $\frac{1}{4}$	160 - 168	141	8	—	$\frac{118}{75}$ $\frac{122}{80}$	Neg.	f. 7- 2
	25	1	5 - 6 $\frac{1}{2}$	107 - 135	137	28	—	$\frac{100}{75}$ $\frac{120}{70}$	"	m. 8
	41	5	5 - 7	160 - 180	150	20	—	$\frac{110}{70}$ $\frac{115}{75}$	"	f. 7- 7
	32	2	5 - 7	147 - 158	143	11	—	$\frac{120}{75}$ $\frac{122}{70}$	"	m. 8- 1
	21	1	5 - 3 $\frac{1}{2}$	102 - 123	124	21	—	$\frac{118}{70}$ $\frac{125}{70}$	"	f. 7- 2
<i>Exophthalmic Goiter</i>	27	4	5 - 6	151 $\frac{1}{2}$ - 155	135	3 $\frac{1}{2}$	—	$\frac{135}{85}$ $\frac{160}{92}$	"	m. 8- 5
<i>Endocrine Dis- turbance</i>	21	2	5 - 4 $\frac{1}{2}$	153 - 153 $\frac{1}{2}$	127	$\frac{1}{2}$	—	$\frac{130}{80}$ $\frac{120}{70}$	"	f. 7- 2
	20	0	5 - 6	154 - 164	132	10	—	$\frac{104}{65}$ $\frac{145}{80}$	"	f. 8- 4 $\frac{1}{2}$
	22	0	5 - 4 $\frac{1}{4}$	146 - 162	127	16	—	$\frac{118}{68}$ $\frac{130}{80}$	"	f. 7-14
	35	4	5 - 4	138 - 148	134	10	—	$\frac{120}{75}$ $\frac{122}{70}$	"	f. 7- 4
	25	2	5 - 7	195 - 198	139	3	—	$\frac{142}{95}$ $\frac{110}{75}$	"	{ f. 5- 8 } { f. 7- }
<i>Mental Alien- ation</i>	34	0	5 - 4	135 - 159	130	24	—	$\frac{118}{75}$ $\frac{130}{85}$	"	m. 7- 7
	27	0	5 - 5	135 - 133	131	—	2	$\frac{130}{70}$ $\frac{112}{65}$	"	m. 8- 6
	42	4	5 - 3	150 - 153	135	3	—	$\frac{160}{90}$ $\frac{135}{72}$	"	f. 9- 4
	37	3	5 - 4	125 - 149	134	24	—	$\frac{114}{70}$ $\frac{145}{88}$	"	f. 8- 8
	19	0	5 - 5 $\frac{1}{2}$	116 - 135	127	19	—	$\frac{115}{65}$ $\frac{120}{75}$	"	m. 7-11
<i>Epilepsy</i>	28	0	5 - 4 $\frac{1}{2}$	166 - 166	129	0	0	$\frac{126}{70}$ $\frac{120}{80}$	"	f. 7
<i>Chorea</i>	23	0	5 - 4	180 - 160	125	—	20	$\frac{110}{78}$ $\frac{160}{95}$	"	m. 7- 9
	30	4	5 - 5	156 - 160	135	4	—	$\frac{120}{80}$ $\frac{120}{85}$	"	m. 5-10
	31	2	5 - 5	150 - 165	135	15	—	$\frac{120}{70}$ $\frac{145}{88}$	Alb.	f. 6- 6
<i>Diseases of the Heart</i>	23	0	5 - 0	93 - 99	114	6	—	$\frac{95}{65}$ $\frac{95}{68}$	Neg.	m. 6
	23	1	5 - 2 $\frac{1}{2}$	105 - 136	120	31	—	$\frac{125}{55}$ $\frac{145}{90}$	"	f. 7- 2
	16	0	5 - 3	98 - 110	120	12	—	$\frac{160}{125}$	Alb. Casts	m. 7-14
	28	0	5 - 7	135 - 145	139	10	—	$\frac{190}{70}$ $\frac{192}{80}$	Neg.	f. 5-
	19	0	5 - 6	140 - 151	128	11	—	$\frac{140}{70}$ $\frac{150}{90}$	Neg.	f. 7-12
	26	1	5 - 5	105 - 137	131	32	—	$\frac{118}{70}$ $\frac{120}{75}$	Neg.	m. 6- 8

TABLE VII—CONT'D

DISEASE	AGE	PARA	HEIGHT	WEIGHT	ST. WT.	GAIN	LOSS	B. P.	URINE	BABY SEX WT.
<i>Appendectomy previous to Gestation</i>	19	0	5-4½	125 - 165	124	40	—	130 134 80 80	Neg.	m. 7-8
	21	0	5-1½	119 - 134	117	15	—	125 115 75 80	"	m. 8-8
	26	0	5-7	141 - 147	139	6	—	130 118 80 75	"	f. 7-4
	31	2	5-2½	119 - 129	125	10	—	120 128 70 75	"	m. 7-6
	22	0	5-5	120 - 140	128	20	—	120 118 85 80	"	m. 8-2
<i>Nephritis following eclampsia of previous deliveries</i>	28	1	5-5	124 - 126	131	2	—	170 165 100 95	Alb.	m. 4-1½
	37	2	5-3	134 - 135	131	1	—	135 165 80 110	"	f. 6-8
	36	1	5-5	140 - 150	139	10	—	195 210 100 120	Alb.	f. 7-8
	31	1	5-5	152 - 140	135	—	12	140 118 70 70	Neg.	f. 5-7
<i>Pylitis</i>	27	3	5-4	189 - 170	127	—	19	130 114 75 65	Pus Alb.	m. 8-5
	24	1	5-5	153 - 151	128	—	2	112 115 70 70	Pus Alb.	m. 8
	23	0	5-3	128 - 140	122	12	—	130 130 60 80	Pus Alb.	m. 7-14
<i>Cesarean section</i>	32	0	5-6	139½ - 144	139	4½	—	102 130 60 80	Neg.	m. 7-12
<i>Delivery after having previously had cesarean section</i>	34	1	5-6	140 - 150	139	10	—	110 135 75 80	"	f. 9
	24	1	5-5½	143 - 148	130	5	—	120 105 80 70	"	m. 8-6½
<i>Old Primipara</i>	42	0	5-9	149 - 170	159	21	—	110 125 75 80	"	f. 5-12½
	35	0	5-6	172 - 167	143	—	5	130 145 90 100	"	f. 8-3
	37	0	5-6¾	164 - 160	146	—	4	140 120 80 85	"	m. 9
<i>Patients who had previously had large babies, of nine pounds, or more</i>	27	2	5-3½	120 - 124	126	4	—	110 112 65 70	"	f. 7-12
	31	1	5-5	110 - 127	135	17	—	110 120 70 75	"	f. 7-14
	27	2	5-3¾	123½ - 145	126	21½	—	125 115 75 75	"	f. 8-2

In considering weight during pregnancy in a patient who had previously had tuberculosis and who was underweight at the beginning of pregnancy, an effort was made to increase her weight a moderate amount. There is only one of these patients who had active tuberculosis. She gained twenty pounds, was thirty pounds over standard weight, and is now in an arrested state.

The patient with exophthalmic goiter was operated during preg-

TABLE VII—CONT'D.

DISEASE	AGE	PARA	HEIGHT	WEIGHT	ST. WT.	GAIN	LOSS	B. P.	URINE	BABY SEX WT.
<i>Patients whose babies weighed nine pounds or more</i>	29	1	5 - 2½	135 - 148	122	13	—	120 128 80 75	Neg.	m. 9- 7
	19	0	5 - 4½	144½- 162½	124	18	—	114 112 60 75	"	f. 9
	26	2	5 - 5½	150 - 162	133	12	—	110 110 60 60	"	m. 10-1
	23	1	5 - 4	159 - 165	125	6	—	115 120 70 70	"	m. 9-13
	30	1	5 - 5	117 - 141½	135	24½	—	100 135 70 80	"	f. 9- 5
	32	0	5 - 7¼	163½- 158	146	—	5½	130 130 80 80	"	m. 9- 5½
	20	0	5 - 6	118 - 148	132	30	—	104 150 60 85	"	m. 10-12
	25	0	5 - 7½	153 - 180	142	27	—	125 108 65 75	"	m. 9
	23	0	5 - 3¼	121 - 130	122	9	—	110 100 60 70	"	m. 9
	24	0	5 - 3	137 - 160	122	23	—	130 130 80 80	"	m. 9- 4
<i>Normal cases No particular pathology as to personal history or that occurred during pregnancy or puerperium</i>	26	1	5 - 6½	132 - 136	135	4	—	115 116 65 60	"	m. 7- 4
	25	1	5 - 4	109 - 132	127	23	—	122 118 65 70	"	m. 8-14
	33	1	5 - 8	151 - 152	147	1	—	115 110 80 65	"	f. 7-10
	27	2	5 - 2	127 - 149	120	22	—	120 109 70 70	"	m. 7-14
	31	2	5 : 2½	143 - 153	125	10	—	130 130 75 80	"	m. 8-14
ABNORMAL FETUS										
<i>Hydrops-uni-versalis fetus</i>	28	2	5 - 2	150 - 162	120	12	—	115 145 85 85	"	m. 2260 gr. 38.5 cm.
<i>Deformed Geni-tals</i>	21	0	5 - 4½	118 - 135	127	17	—	145 150 90 100	"	m. 5- 4
<i>Anencephalic Monster (premature 7 months)</i>	28	0	5 - 1	115 - 117	118	2	—	110 110 80 80	"	f. 5
<i>Hydatidiform Mole</i>	19	0	5 - 3	120 - 130	120	10	—	100 125 60 75	"	

nancy, and later came under my supervision in the last trimester. No particular attempt was made to prevent an increase in weight, yet she gained but three and one-half pounds. Her blood pressure was usually high. She was very nervous. Both labor and the puerperium were normal.

All of the cases reported under "endocrine disturbance" were not typical. These patients on their first visit were over standard weight from four to seventy-nine pounds, and were cautioned that an excessive gain was hazardous. Many of these patients were given thyroid

extract for a period of several months. Their appetite was lessened and a reduction of weight was the result. Under this treatment, six patients reduced in weight, one as much as seventeen pounds. All of these patients felt better, were more active and mentally alert.

Some of the cases under "mental alienation" were patients who were under treatment of psychiatrists during pregnancy. These patients were usually difficult to control and did not cooperate because they failed to realize the necessity. Some of the other patients had previously had a breakdown. One patient developed insanity six weeks after a normal delivery with no symptoms present during gestation.

The patient who had epilepsy was overweight at the first visit. She had but one or two attacks while under my supervision, and these were at a time when her weight increased two to five pounds because she failed to follow instructions relative to diet and elimination. Upon reduction of weight, she improved.

Three cases of chorea are recorded, two of these had chorea in early childhood, the disease complicating their pregnancies. The other patient, when referred to me, was in a very critical condition and suffering intensely. The twitchings began in the left arm, extended to the left side and until the entire body was affected. These seizures were so severe that she shook the bed. Several teeth were extracted which were in poor condition. This caused immediate improvement, which lasted for about two weeks. Upon recurrence of the disease, I induced labor, which was uncomplicated. The patient immediately began to improve. Luminal was used throughout to control the seizures.

Patients with heart lesions should not gain more than fifteen pounds above that of standard weight. This makes labor easy and lessens the strain on the heart.

There were three patients in this series with eclampsia during previous pregnancies, and a high blood pressure. As they gained in weight, their blood pressure would rise. On reduction of weight, their blood pressure had a tendency to reduce. Patients of this type do better when the gain in weight is very moderate.

The diet should be very moderate for those patients whose pregnancy is complicated with pyelitis to prevent any particular gain in weight over standard.

There are two patients listed who had previously had cesarean section. They were given a test of labor, and each was delivered normally. An effort was made to prevent any particular gain in weight as they were both of standard weight at their first visit.

There should be no difficulty at the delivery of an old primipara if the gain in weight has not been above the reproductive gain.

The heart is capable of effectively meeting the demands of normal

pregnancy, but may fail in its adaptiveness to an abnormal function of furnishing blood to unnecessary tissues acquired during pregnancy. The kidneys and liver should not be required during this physiologic process to carry an extra burden; neither should it be necessary for the digestive tract to dispose of food that the body does not need. An evidence of this embarrassment is shown by difficult breathing during pregnancy.

My observations relative to weight during pregnancy are as follows:

1. For those patients whose weight at the beginning of gestation is near standard, the gain for reproduction should not be more than fourteen pounds.

2. I find that gain in weight is greater in the primipara than in the multipara, although it has been thought that the opposite is the case.

3. Standard weight should be our guide. If the patient is below standard, the weight should be increased; if greatly above, reduction should be made moderately, or the prevention of any gain.

4. Patients whose weight is above standard and who continue to increase over the reproductive weight will manifest preeclamptic symptoms, as edema, high blood pressure and albuminuria.

5. Increased weight above the reproductive gain complicates cardiovascular-renal diseases, aggravates epilepsy and psychoses, and encourages stomach and intestinal disturbances.

6. Tuberculous patients under standard weight should be brought above the reproductive weight, but not greatly so.

7. Breast feeding is more successful in those patients whose gain is not above fifteen pounds.

8. The weight of the baby is apparently not so great in patients whose gain in weight is limited.

9. Certain endocrine disturbances during pregnancy increase the appetite, and, if not controlled, will result in excessive weight.

10. The duration of labor is shortened several hours where the gain in weight is not greater than fifteen pounds over standard weight.

11. An excessive gain in weight complicates labor, lowers resistance to infection, and is a factor in causing fetal injury.

12. An abnormal gain in weight is hazardous in a patient where cesarean section is indicated, or for one who has previously had a cesarean section.

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# Department of Maternal Welfare

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## RESPONSIBILITY OF THE MEDICAL PROFESSION IN FURTHER REDUCING MATERNAL MORTALITY\*

BY AUSTIN FLINT, M.D., NEW YORK, N. Y.

THE responsibility of the medical profession in further reducing maternal mortality rests chiefly upon those who practice obstetrics as a specialty, but more particularly upon those who teach obstetrics.

No marked and lasting reduction is possible, unless the rank and file of the medical profession participate in the advancement of our knowledge of the causes of the present high mortality and, by improved methods, eliminate a certain proportion of complications now known to be avoidable.

To my mind, the most important single factor which will produce improvement in maternity statistics is the better education of the undergraduate student. I feel that it is a mistake to try to educate the average medical student to become an expert obstetrician and that most of our time and efforts should be devoted to a more thorough drilling in the care of the so-called normal cases. It is in this class of cases that most of the obstetrical sins are committed. Unwarranted interference in the course of a normal labor is responsible for a large proportion of the complications which too often result in invalidism and actual death. For example: induction of labor for trivial indications is followed in a very large proportion of cases by conditions demanding operative delivery, which frequently results in injury to the mother and often, in death of the child.

During the past few years many important changes in our methods of teaching obstetrics have been made, and graduates in medicine are now far better qualified to practice midwifery than previously.

In order to better appreciate the differences between former methods and those now employed, we should contrast methods and facilities of earlier days with those of the present time. It will perhaps help us to improve still further and aid us in solving our problems. \* \* \* Gradually, year by year, clinical methods of instruction in obstetrics have developed and increased, and didactic methods have become relatively less important. The number of hours of instruction are practically three times as many as they were a few years ago. The student now has two years of this increased number of hours of instruction instead of one year. During their third college year instruction begins with recitations assigned from a textbook, and after a short time, clinical work in sections at a hospital, and also a few didactic lectures are added. During the summer between the third and fourth year all students have from two to three weeks instruction at a special hospital where they spend their entire time, and then, during the fourth year they take up more advanced clinical work. I believe that obstetric surgery should be done only by an expert and this belief I always impress as strongly as possible on all students.

In order to qualify as an obstetrician at least one year must have been spent in a maternity hospital, following an internship in a general hospital. The expert should also have had an extensive experience in general medicine, surgery and pediatrics.

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\*Abstracted from a paper read at a meeting of the Section of Obstetrics and Gynecology, New York Academy of Medicine, January 27, 1925.

Maternal mortality will be reduced as soon as operative deliveries are taken out of the hands of the incompetent and sent to maternity hospitals. There should be a greater number of these special maternity hospitals, partly to take care of the increasing number of patients who wish to go to a hospital in order to have the advantage of more skilled care, and partly to help in the education of expert obstetricians. The great mass of maternity work is in the hands of men who are not expert, and of midwives. Something should be done to stem the tide of obstetric operations performed so frequently by these men, with its resultant high mortality and morbidity, and more closely drawn indications for operations should be promulgated.

The general public are demanding more and more, and rightly so, the services of men who are really expert in obstetrics. This increasing demand will give a broader conception of the scope of obstetrics and help in its more rapid advance.

If the practice of obstetrics were invested with greater dignity and better paid, more able men would be attracted to this branch of medicine. The general public should be systematically educated to a more adequate appreciation of the services of the obstetrician and then would follow a more adequate remuneration. When this comes to pass the problem of the midwife will also pass and she will disappear spontaneously. All of this will help reduce the deplorably high mortality.

Under modern conditions, labor is not a normal function, and should not be so considered either by the profession or by the public. It kills thousands of women every year, leaves at least a quarter of all cases more or less invalided, is attended by severe pain and tearing of tissues, and kills 3 to 7 per cent of all babies. Can this be called normal or physiologic function?

Mauriceau said that "pregnancy is a disease of nine months duration," Whitridge Williams, that "50 per cent of pregnant women are toxic."

It is estimated that 25,000 women die from childbirth annually in the United States. The actual maternal mortality reported from the registered area, only four-fifths of the total area, and, known to be incomplete, is 16,000, so that the estimated mortality of 25,000 is really too low. Of this total from 6,000 to 8,000 women die every year from infection, 5,000 from eclampsia, and 4,000 from hemorrhage,—all preventable or at least capable of great reduction. Why is the care of pregnancy and labor left so much to the young and incompetent, or even to the ignorant midwife?

A review of the development of the obstetric branch of medicine shows that progress, compared to the advances made in general surgery and in general medicine, has been slow. In the last twenty years it has been more rapid owing, at least in part, to the establishment of maternity hospitals and to better teaching in our medical colleges.

To be more specific, let me briefly speak of the modern treatment of some of the common complications, likely to occur in routine practice, which are the cause of a large proportion of maternal deaths. These are: sepsis, or puerperal infection; eclampsia; and hemorrhage. The operations are the induction of labor; forceps; and cesarean section, to which may be added the Potter version and the prophylactic forceps operation proposed by DeLee. Of these puerperal sepsis is the most important because the most frequent. It is estimated that from six to eight thousand deaths occur annually in the United States from this cause alone. In special hospitals, however, such mortality has almost disappeared. The morbidity from milder grades of infection is about five times as frequent as the deaths and how many women are left incurable invalids it is impossible to estimate. I believe that infection occurs most frequently in private practice and in general hospitals with a maternity service and least frequently in special hospitals. Reduction of maternal mortality from this source should follow the establishment of



more special hospitals and can be controlled in private practice by the universal use of an aseptic technic such as would be employed for any surgical operation.

Eclampsia, like sepsis, is preventable and my own experience leads me to believe that the improvement is due directly to prenatal clinics. At Bellevue Hospital since the present routine was developed in 1921, about five thousand women have been delivered, with only one case of eclampsia. In 596 consecutive deliveries there were 26 cases of toxemia, six of which developed eclampsia and not one of these had any prenatal care. Of the remaining 20 cases of toxemia, 14 did not have prenatal care and none of the other six developed eclampsia. Obviously an extension of prenatal hospital clinics and the adoption of their methods in private practice will further reduce the large number of deaths from eclampsia. In addition our statistics for both mother and child have greatly improved by the adoption of conservative methods, for we rarely induce labor and never use forcible methods of delivery.

In hemorrhage, the third most frequent cause of death in childbirth, all precautions must be taken as a routine for its prevention. Among the operations responsible for needless mortality I place the induction of labor first, because with the exception of forceps it is the most frequent. The physiologic preparations for labor must be present in order for a normal outcome to follow an induction and unless this is present difficult operations are often necessary to complete the process so thoughtlessly started. High forceps is a capital operation and should never be attempted except by an expert. Cases with floating head should be sent to a maternity hospital and in the hands of the moderately expert obstetrician version is safer and easier. I believe that the other forceps operations are performed too frequently and require judgment and skill to avoid injury. Although the recognized indication is delay, the cause of the same is in many instances not diagnosed. I believe, for example, that posterior positions of the occiput occur in from 30 to 50 per cent of all vertex presentations and the majority are not recognized. Forceps in such cases should only be used when delivery is impossible without them and the majority will deliver spontaneously if sufficient time is given.

There is a growing conviction that cesarean operation is done too frequently and for insufficient indications, because, like induction of labor, it is easy to perform, although in the best hands it carries a mortality of from 2 to 5 per cent. In many instances delay in its performance has resulted in normal termination of the labor. The routine application of forceps in normal cases in order to save suffering on the part of the mother, with possible lacerations and injurious pressure is a source of danger because unfortunately too many consider themselves sufficiently expert to use this method and cause serious damage instead of preventing it. Routine version in order to reduce the time of labor should also be condemned, for except in the hands of one skilled by long practice it will carry an unjustifiably large maternal and child mortality.

The responsibility of the medical profession in further reducing maternal mortality is very great. I believe that a material reduction can be made now, at the present time, if only the knowledge possessed by the few could become more general.

Less operating, more conservatism is, in my opinion, the outstanding remedy for the present high mortality. Education of the medical student, education of the mass of medical men not now expert, education of the public to demand better expert care, with a willingness to pay for it, the establishment of more hospitals devoted exclusively to maternity cases, with greater conservatism and more thorough asepsis in private practice will go far towards accomplishing this desirable result.

# Society Transactions

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## AMERICAN ASSOCIATION OF OBSTETRICIANS, GYNECOLOGISTS AND ABDOMINAL SURGEONS

THIRTY-SEVENTH ANNUAL MEETING

CLEVELAND, OHIO, SEPTEMBER 18-20, 1924.

*(Continued from May)*

DR. OSKAR FRANKL, Vienna, Austria, presented (by invitation) a paper entitled **The Coincidence and Interference of Uterine Tumors.** (For original article, see page 745.)

### DISCUSSION

J. F. BALDWIN, Columbus, Ohio.—Years ago I did supravaginal hysterectomies but I had some bitter experiences with cancer or sarcoma developing later. I accordingly changed my technic, and now it is only under the rarest circumstances that I do not make a panhysterectomy. I think the pictures which have been shown us illustrate the wisdom of that course. I do not think it is right to say that the increase of mortality between the complete and the incomplete operation is worth consideration: if the operation is properly performed a small fraction of one per cent will easily cover the difference. I have personal knowledge of twenty-two cases in which cancer has developed in the cervix after supravaginal hysterectomy.

There was a paper published in the April issue of the Texas State Medical Journal in which the writer, a professor of gynecology in a Southern college, made the statement, which to me was amazing and almost unbelievable, that the mortality as he had found it in different hospitals by different operators, was for panhysterectomy 9.44 per cent, and for supravaginal hysterectomy 5.29 per cent. His conclusion was that the incomplete operation should be advised rather than the complete because of this difference in mortality. A little later I noticed that a professor of gynecology in the University of Pennsylvania had apparently approved of his attitude. In his paper on obstetrics yesterday, Dr. Bill urged that we should teach better obstetrics and that the doctors should be educated up to that level: we should get better doctors and better obstetrics. The same principle should be adopted in surgery.

DR. EDWARD J. ILL, Newark, New Jersey.—It would be rather presumptuous to try to discuss such figures as we have had presented by Professor Frankl. One can hardly come to a definite conclusion in so important a matter simply by listening to the reading of this remarkable paper: When this lecture is published it will be the source of a good many discussions and a good many hours of careful study.

I want to say this much, that we are very apt to be misled by figures. Suppose we should consult the autopsy records of John Hopkins and the Massachu-

setts General Hospitals, we will find that twenty-eight per cent of all females over thirty-five years have fibroid tumors. If that is the case and their records have come from Mr. Hoffman, the statistician of the Prudential Life Insurance Co., then a 16 per cent ratio of carcinoma of the cervix in fibroid tumors is only an incident in the fibroid question.

Whenever a malignancy has been found to develop in a fibroid there is a new onslaught on these tumors and their unfortunate possessors. Carcinoma can only develop in the adenofibroid while sarcoma is developed in any one. It must be exceedingly rare as in over seven hundred operations I have seen neither.

I trust, that Professor Frankl's paper will not go out as another incentive to remove every fibroid. I am told by the pathologist of the Buffalo Cancer Institute that he found eighteen malignant fibroids in over twenty thousand cases. Statistics show, that there are nearly 500,000 women after the thirty-fifth year with fibroids in the State of New York. Malignancy must be exceedingly rare and should not be an indication for removal of the simple symptomless tumors.

I trust that when Professor Frankl closes the discussion he will tell us how many recurrences there have been in those operated cases. The recurrence in the end must be a proof of a malignancy. Pathologists do not always agree on the appearance of the specimen presented for their opinions.

DR. HENRY SCHMITZ, Chicago, Illinois.—I was particularly interested in Dr. Fränkl's statement of the incidence of pregnancy. We recently made a study of the incidence of the number of pregnancies in 400 consecutive cases of uterine carcinomata. In the 400 cases we found 19 per cent sterile women, and 60.5 per cent of women with three or fewer pregnancies. We thought this coincidence might be due to the predominance of small families in the States. Therefore we took 400 women of cancerous age, between 40 and 50 years, who had entered the hospital for other conditions than cancer, to establish the number of pregnancies in these women. About 21 per cent had no children, and 65 per cent had three or fewer children. Therefore the incidence of pregnancy and labor does not unduly influence the frequency of carcinoma of the uterus. The only explanation I can offer is a study of the statistics of the Health Department of Budapest. Separate records of the Jewish and non-Jewish population are kept. The Jewish women always marry early and have a great many children, yet they have in comparison to the non-Jewish women only one-third the number of uterine carcinomata. Whether this is due to absence of chronic infection in the Jewish women, which is prevalent in women limiting the number of pregnancies of labor, in an open question.

DR. R. R. HUGGINS, Pittsburgh, Pa., presented a paper entitled **The Relation of Postoperative Peritonitis to Periodic Epidemics of Infection.** (For original article, see page 819.)

#### DISCUSSION

DR. PAUL KLEMPERER, New York City.—Sometimes there is an opportunity to see postmortem, in children particularly, peritonitis of which we cannot find any trace of its origin in the abdominal cavity. Careful examination in these cases of the tonsils shows generally an acute tonsillitis.

I want to call attention that in rare instances we find in the appendix an infection which can be traced back to the acute condition in the tonsils.

I had an opportunity during the last year to see one case of a young woman who was admitted to the hospital for an operation on the uterus. The appendix

was removed for prophylactic reasons and in routine examination of the appendix we found a few polymorphonuclear cells in the lymphatic tissue. This patient had entered the hospital with a slight sore throat, but was operated on immediately and it was not noticed she was sick.

We have to consider always the relation between the tonsils and abdominal cavity. All cases of appendicitis are not due to primary tonsillitis, but there are certain cases of primary tonsillitis. The so-called tonsil of the appendix, may follow true tonsillitis.

DR. HENRY SCHMITZ, Chicago, Ill.—We have made over 400 examinations of the bacterial flora of the cervical canal before operation and then during or after the operation made cultures from the infected areas. The most interesting conclusion was that usually the infection following operation is not caused by the bacteria found in the cervical canal before operation. Therefore the infection is probably introduced into the patient during the operation. Hence strictest asepsis, prevention of unnecessary trauma, the development of an operating-room system which enables one to practice speed without undue haste, are some of the means to prevent infections.

DR. H. O. PANTZER, Indianapolis, Indiana.—How recognize the infected case before operation? Foci of infection exist in these cases, and the question is, how to detect them. They are very prone to be anywhere within the abdomen, preferably within the parts we are called upon to operate, because these parts constitute each a locus minoris resistentiae which by the bacteremia prevailing with the epidemic infection may have become infected with the disease.

Take rectal temperatures. It is surprising to what extent this will inform you. I have taken oral and rectal temperatures since 1891 and have had a guide in this procedure that has been very helpful to me.

My first case was a most striking one. A woman was operated on for an uncomplicated retroflexion of the uterus. In the preantiseptic days we expected trouble after every operation. Within twenty-four hours my patient had a temperature of 103°. I examined the pelvis and the abdominal wound and could find no evidence of infection. My vaginal touch did not indicate to me temperature as high as registered, and I suggested to the nurse that she take the temperature again. It was found as before. I then had it taken by rectum, and, while we had 103 by mouth, we had only a little over 100 by rectum. It indicated the focus of infection was remote to the pelvis, was nearer to the mouth. Examination of the throat revealed white patches there. When the patient learned of this, she replied, "Why yes, I have such disease recurrent every now and then." Accordingly the abdominal temperature in cases of infected foci within its bounds will ordinarily reveal one to more degrees by rectum than by mouth. How proceed in such cases? Give natural sodium salicylate in ample doses, one drachm and more daily a few days before operating. It is surprising how well this controls old infection.

DR. W. C. G. KIRCHNER, St. Louis, Mo.—Recently a case was referred to me for gall-bladder operation. After a very careful examination my findings were negative as to the gall bladder, but there was a slight fever. I thought at first it was tuberculosis, and after x-ray pictures were taken and a careful study made, that was discarded. The blood examination showed the presence of streptococcus in the blood, and such a case then would not be a very favorable one for operation on account of the danger of a general peritonitis resulting.

DR. W. WAYNE BABCOCK, Philadelphia, Pa.—It takes some courage to report cases of peritonitis after an apparently clean peritoneum was opened,

as not due to the operator or operation. From the old idea that idiopathic peritonitis occurred, we reached the point where we felt that peritonitis could not develop after an operation unless we were responsible. That was a good attitude to take. But we do know that pneumococcic peritonitis occurs after pulmonary infection and that hemolytic streptococcic peritonitis occurs during influenza. These hematogenous peritoneal infections are usually fatal. It is very reasonable to believe that if there are virulent bacteria circulating in the patient's body and we open the abdomen before the patient's resistance has been stabilized, we may localize and excite the infection in the peritoneum. This, I think, is the important point about the paper, that we should, if possible, avoid operation when a patient has an acute infection lest we excite trouble. We should fear the reaction in the peritoneum as we have in the lungs, and as we have feared the simpler and supposedly noninfectious reaction that so often occurs when we operate during the menstrual period.

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## OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF NOVEMBER 6, 1924

DR. JESSE O. ARNOLD IN THE CHAIR

DR. PHILIP F. WILLIAMS presented a specimen of **Abdominal Pregnancy**.

This patient was received in the Presbyterian Hospital, with a diagnosis of threatened miscarriage. Upon examination by an assistant I was notified that she had a probable incarceration of her uterus, about six months' pregnant. Instruction was given that an attempt at reposition be made, and if possible the uterus be evacuated *per vaginam*. This was found to be impossible and I then examined the patient and diagnosed a cystic mass obstructing the inlet. As it was possible to feel a solid portion within the cyst, I felt that it was very probably a dermoid. I also was impressed that it would be extremely dangerous, if not impossible, for the fetus to be extracted *per vaginam* and therefore advised section.

At the operation we found that there was a cyst obstructing the pelvic inlet, but that it happened to be the amniotic sac and placenta, and that the true diagnosis was an advanced abdominal pregnancy. I have seen several cases of abdominal pregnancy, but never one showing this particular finding, namely, a cystic mass obstructing the pelvic inlet.

The baby was breathing when delivered and of course the placenta was therefore a possible source of fatal hemorrhage.

In this particular instance there was bleeding from the iliac artery, which necessitated a lateral ligature. The woman has done perfectly well since the operation.

The point of paramount interest in this case was the difficulty in diagnosis. I had never seen an extrauterine pregnancy which could so perfectly simulate an ovarian cyst impacted in the pelvis during pregnancy.

DR. CHARLES C. NORRIS and DR. M. E. VOGT contributed a paper entitled **Malignant Ovarian Neoplasms, with Report of the Result in a Series of Fifty-six Cases,\*** which was read by Dr. Norris and in which the conclusions were as follows:

1. In a series of 1,028 ovarian neoplasms, 11 per cent were malignant.
2. The symptomatology is frequently silent even when the tumor is of large size and dissemination has occurred.
3. The histologic diagnosis is of great aid in determining the prognosis and may give valuable information regarding the value of postoperative x-ray and radium treatment.
4. The two most frequent forms of malignant ovarian tumors are the glandular adenocarcinoma and the papillary adenocarcinoma.
5. Our end-results showed 23 per cent of the glandular adenocarcinomatous patients alive three years or more after operation as against 70 per cent of the papillary adenocarcinomata.
6. Almost 60 per cent of cases which appear favorable at operation survive three years.
7. Malignant ovarian neoplasms have their origin in one of five ways: they are (1) malignant from onset; (2) degeneration of a benign tumor; (3) metastatic; (4) implantation growth (often transtubal); (5) contiguity.
8. Benign ovarian neoplasms frequently undergo malignant change, usually of the epithelial type.
9. The transtubal route of dissemination from a fundal carcinoma to the ovary is not uncommon.
10. The transtubal dissemination from an ovarian carcinoma to the fundus of the uterus is possible.
11. Ovarian carcinomata may originate from perforating (Sampson) cyst.
12. In such associated cancers the ovarian lesions are the largest, regardless of which is the primary focus.
13. The prognosis under such conditions is unfavorable, seven of our eight cases failed to survive three years.
14. The prognosis is less favorable in the primary malignant than in the cases of malignant degeneration of benign cysts.
15. Even when apparently hopeless, cases of malignant ovarian cyst should generally be submitted to laparotomy.
16. During the removal of malignant ovarian cysts, tapping of the tumor to facilitate its removal through a small incision is likely to result in dissemination.
17. Primary malignant tumors are usually bilateral and malignant degeneration of benign neoplasms tends to become so.
18. Secondary malignant ovarian tumors are generally larger than the primary growths from which they originate.
19. Malignant ovarian neoplasms may occur at any age.
20. Seven per cent of the pseudomucinous ovarian cysts showed carcinomatous degeneration and a smaller proportion of the dermoids.
21. The differentiation between the semimalignant simple ovarian papillomata and carcinoma is frequently impossible before operation and in some instances cannot be made except by histologic examination.
22. Recurrence generally develops in the first year, less frequently during the second and rarely after the third year.
23. The prognosis is decidedly less favorable in bilateral cases than when the neoplasm is single.

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\*This paper will appear in full in a later issue.

24. In the presence of a malignant ovarian tumor on one side and a normal ovary on the other, a hysterectomy and bilateral salpingo-oophorectomy is the safest procedure.

25. The value of postoperative irradiation with x-ray or radium is still undetermined but was uniformly unsuccessful in our small series.

### DISCUSSION

DR. BROOKE M. ANSPACH.—In looking rather hurriedly over my own cases, and taking the clinical reports only, in a series of twenty-nine cases, combining all forms of ovarian carcinoma, there were nine cases absolutely hopeless: as soon as the abdomen was opened this fact was unquestionably apparent. The average age of these women was fifty-one; there was one, forty years old; there were two, forty-three years old. In the papillomata, which may be called semimalignant, the practical fact that I have gleaned from my experience is that one should always try to remove the tumor, if it seems technically possible to remove the greater part of it. Even though you leave some neighboring areas, it is possible that the growth will undergo regression, and the patient will recover. It is probably true that in such instances the papillomata were not malignant. About 66 per cent of these papillary growths are malignant, but nothing short of the most careful histologic examination of the whole mass will determine in a given case whether it is or is not malignant. I have had three cases at least in which, after removal of the major part of the growth, there was still a considerable area left behind, and, so far as I know, these three patients are still alive and well. In one, I used radium, in another I used the x-ray after the operation, and in the third case neither of these was employed.

We should remember that carcinoma of the ovary may give rise to very few symptoms. If one reviews the history of such cases he will find that there have been symptoms but they have been so vague as to disturb the woman very little, and consequently she has not consulted her physician. In a patient I saw last year, with a very extensive growth, attention had not been directed to the pelvis until the last minute; she had lived close to a physician who was her relative; she had had practically no symptoms except a few which were vaguely styled "intestinal indigestion"; there was no menstrual disturbance, and no pelvic pain. Such cases show how careful we should be in taking notice of any symptoms which a woman presents that may be referable to this dreadful disease.

DR. THOMAS R. MORGAN read a paper entitled **Observations on the Rubin Test.** (For original article see page 843.)

### DISCUSSION

DR. JOHN C. HIRST.—I am glad to hear Dr. Morgan's statement that he does not find any better apparatus than the original Rubin. I do not see how it could be improved for the purpose. We are doing all our work with the original apparatus. The rate of flow of the gas I think is one of the most important factors. I believe the pulsating mechanism should rotate at the utmost not over four pulsations a beat. Over that will cause uterine spasm and falsify our readings. We all know that low pressure and high pressure are not necessarily relative terms. To illustrate: In one patient on whom I did the test last year the gas passed at a pressure of 40 mm., she developed pain after the test and three or four days afterwards because of excessive pain I opened her abdomen and found a ruptured tube; because of hydrosalpinx the gas had passed through the rupture near the uterine end of the tube. Again, as to high pressure, I had one

rather remarkable case of a woman, who was sterile for some four years. I did this Rubin test upon her four separate times at intervals of two weeks, she was patient enough to undergo the ordeal. The tubes were nonpatent at 220 mm. after the fourth test. Six months later she had a three months' miscarriage, following this nonpatent Rubin test. So I believe we have to discount both our low and our high pressures. As to gas suddenly passing through tubes after reaching 170 to 180 and then dropping, I believe that is often due to breaking up of adhesions closing the abdominal end of the tube. We have had several of these cases and quite a few became pregnant very shortly after this Rubin test which would not, I think, have occurred if the sudden dropping had not been due to a rupture of the tube. Our percentage of closed tubes, or of nonpatent tubes, whether they are really nonpatent or not is curiously close to Dr. Morgan's. In patients who come to consult us for sterility we find 42.5 per cent in whom the gas would not pass at 200, which is our upper limit. There is one point of technic. The cervix must be steadied by a tenaculum; if that is caught in anterior or posterior lip we find it impossible to make a tight closure of the os. The tenacula should catch on either side of the cervical canal. If the vagina is filled with fluid, leakage of gas can be shown better. I understood Dr. Morgan to say that there was no case of ruptured ectopic pregnancy ruptured by the test. Is that so?

DR. MORGAN.—I cannot find one.

DR. HIRST.—I had one patient in hospital apparently sterile; no demonstrable signs of pathology in the pelvis. I recommended the Rubin test for her. Within five days of that test she had typical signs of ruptured ectopic pregnancy and abdominal section confirmed this. As long as it is the first one I might as well report it.

It is possible to tell the occlusion of one or the other tube by auscultation over the lower abdomen. The gas can be heard bubbling through. There is only one other point I wish to mention. What are we going to do with patients who have apparently stenosed tubes where the gas pressure passes at 150 to 180 mm.? What treatment can be instituted? There are only two things to do: The Rubin test, repeatedly, or abdominal section to open up the ends of the tubes, which I believe is an entirely unjustified procedure, based on the wrong idea that the fimbriated end is the only part occluded. To do salpingostomy on the abdominal end of the fallopian tube and then close the abdomen with the smug idea that you have relieved the condition is the height of folly. In the many patients on whom this was done I had one patient only who became pregnant and she had an extrauterine pregnancy and required operation for its removal. If the operation is done, however, I think the Rubin procedure has another value; to attempt to keep open that tube. In these borderline cases, where you find partially occluded tubes that cannot be dilated by the Rubin procedure, to allow the gas to pass at a low pressure, I believe nothing more radical should be done.

DR. CHARLES MAZER.—I wish to report a case of salpingostomy followed by pregnancy, operated upon five years ago and which I was treating by means of the Rubin test in the hope of opening the tubes. After four repeated attempts, the gas entered the peritoneal cavity at a pressure of 180 mm. The woman became pregnant. I am in the habit of introducing not less than 300 c.c. of carbon dioxide and do not consider the test positive, unless there is pressure in the epigastrium and pain in one or the other shoulder. I have done, approximately, 1100 to 1200 Rubin tests during the past four years, most of these in my office. The patients remain in the rest room approximately ten minutes after the procedure, and I have never seen any untoward results.



The important feature in the improper performance of the test, is the rapid introduction of the gas. In many cases that were pronounced absolutely occluded I find patent tubes when I permit the gas to enter very slowly, say three revolutions per minute. The introduction of more gas into the uterus than the lumen of the tubes will permit to pass, will cause an ever increasing intrauterine pressure with a rise of the mercury column to 200, notwithstanding patent tubes.

DR. JOHN A. MCGLINN.—I have not use the Rubin test in my office; I do not approve of it. My experience was presented before the society last year relating certain dire results which have occurred in my work from the use of tests. Dr. Hirst reports a case of rupture of a tube at 40 mm. pressure, I think ours was at 20. This particular case was examined under anesthesia before the test was done. We had three cases of tubal rupture and one very pronounced pelvic inflammatory disease following the use of the Rubin test. The Rubin test is of great value in the study of sterility but it is not without danger and its use should be safeguarded. I had a case recently where the test was positive for occlusion. The patient had an induced abortion done after she left her husband. She developed pus tubes and was operated on in a Western Hospital where the history showed that both tubes and one ovary had been removed. Married again and very anxious to conceive, she had a Rubin test done by one of the best men in Philadelphia, who reported both tubes absolutely closed. She later aborted at about two and a half months of pregnancy. The Rubin test was positive for occlusion, both tubes and one ovary had been removed and yet she conceived. I have only had one case in which pregnancy followed salpingostomy and that was a tubal pregnancy.

DR. EDWARD A. SCHUMANN.—As I understand the Rubin test, it was originally designed as a method of determining whether the tubes were or were not patulous. If they were patulous to the passage of gas then it was to be presumed that the sterility was not of tubal origin. If they are not patulous to gas, what about it? The use of gas as a therapeutic measure and dilator for the tubes seems to be a very valuable procedure in light adhesions. What shall we do when the test is positive, and the tubes closed? Salpingostomy is a procedure of but little value, the pregnancies being so small in proportion to the number of cases, that the operation is no longer in common use. The opening of the fimbriated end of the tube means nothing, as it closes up again in twelve hours from exudate.

DR. BROOKE M. ANSPACH.—The Rubin test is principally of value in the case of a woman who is sterile and yet shows no gross lesions to account for her sterility. Here it is well to know whether the tubes are patulous or not before formulating a plan of treatment, the object of which is to promote conception. If the tubes are not patulous she has no chance for any treatment short of salpingostomy. Although salpingostomy is very often a failure it is not always so, and cases of pregnancy have been reported following its use. When occlusion of the tubes has been diagnosed by Rubin's method, one may be surprised, on opening the abdomen, to find the abdominal ostia open. Under these circumstances, the use of Curtis' method of injecting air through the tube into the uterus may show an obstruction at the interstitial portion of the tube. I have had but one experience which might have had a bad ending as the result of transuterine insufflation of the tubes. I had used Haney's method of injecting air through the uterus by means of a glass syringe with a conical point, just previous to dilatation of the cervix and the introduction of a cervical stem. In this instance, the air passed through after a little resistance and I concluded that there was no pathology in the tubes. After I had placed the stem, following the usual custom, of a final pelvic examination to make sure that the uterus and the stem were in proper condition, to my sur-

prise, I found that the patient had an enlargement to the left of the uterus which had not been there before the operation. I obtained permission to open the abdomen. She had an old hydrosalpinx which, previous to the operation, was empty, the fluid having escaped through the uterine end of the tube. The injection of air had distended the closed sac, so that it formed a tumor as large as the fleshy part of the thumb. After exposing it you could press upon it and force the air down into the uterus. I removed the hydrosalpinx, and the woman of course was better off than if we had not made the test. Because it has sometimes caused the rupture of an extrauterine pregnancy, I see no reason why Rubin's test should be given up altogether. Cases of extrauterine pregnancy have been ruptured by simple bimanual examination. We must not give up as hopeless these cases of tubal occlusion. Dr. Estes of Bethlehem reported at the State Medical Society Meeting, a year or so ago, several cases of pregnancy which had followed the operation of implanting the ovary into the cornu of the uterus, where the tube had been cut off flush with the uterine surface. Recently I read the description of an operation devised by a French surgeon, in which the ovary was implanted into an opening made in the wall of the uterus, which went entirely through the myometrium, so that part of the ovary projected into the endometrial cavity. While this is a little more heroic than I should fancy, we must continue to try to relieve these unfortunate women.

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## Item

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At the Annual Meeting of the American Gynecological Society held at Washington, D. C., May 4th, 5th and 6th, 1925, the following officers were elected for the ensuing year: President, Dr. Franklin S. Newell; First Vice-president, Dr. Hiram Vineberg; Second Vice-president, Dr. C. Jeff Miller; Secretary, Dr. Arthur H. Curtis; Treasurer, Dr. Charles C. Norris. Other members of the Council: Dr. George Gray Ward, Dr. John A. Sampson, Dr. Barton C. Hirst, Dr. Howard C. Taylor, Dr. Robert T. Frank, Dr. Henry T. Hutchins.

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## Errata

In the article by Dr. Paul Klemperer, May issue, the sentence in the fourth line, page 623, should read: In three cases of cervical carcinoma the first histologic examination showed the classic picture of basal-cell carcinoma.

In article by Dr. Robert T. Morris, April issue, the legend under Fig. 3, line three, should read: Dots mark other ganglia that are not hypersensitive in this condition.

# Department of Reviews and Abstracts

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CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

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## Collective Review

### New Books

By ROBERT T. FRANK, A.M., M.D., F.A.C.S., DENVER, COLORADO

THE publication of the English translation of Billroth's *The Medical Sciences in the German Universities*<sup>1</sup> could not have appeared at a more opportune time. Though written nearly fifty years ago it appears that the same problems vex the medical educator now as then. Billroth traces the origin of the modern medical faculty from its humble beginning from two to three part-time didactic teachers who expounded Galen and Avicenna, to its present complicated personnel. Just as today the expense of modern medical education, the difficulty of obtaining teachers, the impossibility of providing adequately for rural population, the selection of a proper student body, the suggestion to shorten and simplify the premedical and medical curriculum, was violently agitated. To anyone interested in the problems just enumerated, as well as to anyone who enjoys the history of medicine, this volume will prove delightful and profitable reading.

One of the problems which stirred medical circles in Billroth's time, still continues to be a live topic. The survey just concluded by Mayers and Harrison for the General Education Board on the distribution of physicians in the United States<sup>2</sup> sufficiently attests this. Vacant rural locations are the most striking evidence of uneven distribution. The investigators busied themselves in determining the accessibility and cost of medical services in rural areas, and, finally, in trying to analyze the causes producing the shortage. The question of remedying the situation is of utmost moment. Mayer and Harrison strongly oppose the suggestion of educating a substandard class of physicians for rural practice or of reducing the requirements or the standards of medical education.

At the age of seventy-eight years, after a busy and eventful life A. Martin has written an autobiography<sup>3</sup> primarily intended for the circle of his family and the untold number of students and assistants who know and honor him. To the casual reader this intimate and detailed description of cousins, uncles and aunts, of involved German

<sup>1</sup>The Medical Sciences in the German Universities. A study in the history of civilization. Translated from the German of Theodor Billroth, with an introduction by William H. Welch. New York, Macmillan Company. 1921.

<sup>2</sup>The Distribution of Physicians in the United States. By Lewis Mayers and Leonard V. Harrison. General Education Board. New York, 1921.

<sup>3</sup>Werden und Wirken Eines Deutschen Frauenarztes. Lebenserinnerungen von A. Martin. Verlag von S. Karger, Berlin. 1921.

genealogies and titles, appears a trifle ponderous and prosy, but after this first feeling is overcome the exposé of life in Prussia immediately before and after the Franco-Prussian war of 1870 is illuminating. Even arrived at ripe old age Martin cannot refrain from gloating at the wanton insult offered by him to a French general officer released on parole after the surrender of Metz.

The excellent contributions to gynecology and obstetrics, resulting from Martin's efforts, are touched upon in a most modest way. Numerous trips to England, France and this country are entertainingly described. If one is willing to overlook the many literary shortcomings of this biography its perusal will richly repay.

#### GYNECOLOGY

Stoeckel and Reifferscheid's textbook of gynecology,<sup>4</sup> which is characterized as the thirteenth edition of H. Fritsch *Diseases of Women*, is entirely rewritten and remodeled. For laudably sentimental reasons it is inscribed to Fritsch, their master and teacher. Few short textbooks of gynecology can compare in worth to this volume.

Much of real interest is given in the usually colorless chapter dealing with the examination of the patient. Throughout, directions for therapy are clear-cut, sensible and conservative. The advice not to frighten women into consenting to a hysterectomy for minor cervical lesions, because of their "precancerous" possibilities is excellent. The illustrations are good, and the colored plates, which are fifty-nine in number, are the most striking and instructive that I recall. For sub-acute and chronic adnexal disease protein-therapy and diathermy are recommended. The arrangement is regional except that special chapters are devoted to gonorrhea, pelvic tuberculosis and sterility. Chapters are devoted to diathermy, to hygiene and to the gynecologic pharmacopeia.

The numerous references to the literature are strictly German. Just one American author, T. S. Cullen is referred to, and several illustrations from his *Carcinoma of the Uterus* are reproduced, due credit being accorded. Considering the size of the book, too much space has been devoted to radiotherapy. The operation for anterior colporrhaphy is inadequate. All in all, however, this short treatise is admirable.

Bland's *Gynecology, Medical and Surgical*,<sup>5</sup> forms a bulky volume. It is, as the author himself emphasizes, a compilation, modeled on Montgomery's well known textbook, but as I may add, judiciously tintured by Bland's experience. The book is encyclopedic in scope as is shown by the detailed description of such procedures as the Abderhalden and Wassermann tests, vaccines, transfusion, many methods of conservative gynecologic treatment. Considerable space is devoted to organotherapy, x-ray and radium, yet anatomy is compressed into less than one page of the more than 1200! On the other hand full space is devoted to conservative measures and excellent judgment is displayed in the advocacy of conservatism. Operative gynecology is likewise described with precision and detail. The numerous illus-

<sup>4</sup>*Lehrbuch der Gynaekologie*. Von Professor Dr. W. Stoeckel, Universitaet Leipzig, und Professor Dr. K. Reifferscheid, Universitaet Goettingen. Voellig neubearbeitete 13. Auflage des Lehrbuches von H. Fritsch. Mit 443 Abbildungen im Text und auf 59 farbigen Tafeln. Verlag von S. Hirzel, Leipzig, 1924.

<sup>5</sup>*Gynecology, Medical and Surgical*. By P. Brooke Bland, assistant professor of gynecology, Jefferson Medical College, etc., etc., with 644 illustrations, mostly original, including 43 colored text figures, and 12 insert plates, 10 of which are in colors. F. A. Davis Company, publishers. Philadelphia, 1924.

trations, though lacking in artistic merit, are adequate and instructive. Although the book is replete with quotations and innumerable authors are referred to by name, not one detailed reference to the literature will be found.

To contribute to a composite work always involves a personal sacrifice comparable to anonymity, for, to the memory of the average reader, only the name of the editor remains. The third edition of *Diseases of Women* by ten teachers<sup>6</sup> is but a slight revision of the second edition. The book is well-planned, short and clear. The chapter on chronic ill-health in women from the psychologic aspect, and neurasthenia in relation to pelvic disease is to be commended.

To my surprise no mention is made of the Rubin insufflation test in the diagnosis of sterility. The concept of "chronic endometritis" is still insisted on. The radicalism advised in the treatment of adnexal disease is contrary to the best American and continental opinions.

Cancer of the Uterus by Faure<sup>7</sup> is in the main a surgical exposition. The introductory chapters on pathology, symptomatology and diagnosis are based largely on Siredey's collaboration with the author in their large *Traité de Gynécologie*. Faure advocates biopsy to assure the diagnosis. On the other hand he prefers operations to radium in all operable cases, and considers cases in which the uterus is mobile as operable. He performs an abdominal panhysterectomy with preliminary ligation of the hypogastric arteries. The Wertheim vaginal clamp is not employed and no attempt to remove all lymph glands is made. He concludes the operation by extensive drainage à la Mickuliez. As no statistics are given, his final results cannot be evaluated.

Wintz, together with Dyroff,<sup>8</sup> has added another small atlas to the two already reviewed in these columns (radiotherapy of carcinoma of the breast, and of uterine cancer), which deals with the technic and interpretation of pneumoperitoneum induced through a puncture of the abdominal wall.

The authors inject 500 to 700 c.c. of air, taking precautions resembling those used for induction of pneumothorax, in order to avoid subcutaneous emphysema, air embolism and puncture of intestine. Excellent illustrations of x-ray photographs, with elucidating sketches of operative confirmation of the findings, lend additional value to this interesting and important technical guide.

Two monographs pertaining to the field of gynecology appear among the Würzburger Abhandlungen.

Stübler and Brandes have worked up the ovarian growths<sup>9</sup> treated at A. Mayer's clinic at Tübingen. The material covers 682 tumors. The authors throw no new light upon the questions of genesis or treatment.

<sup>6</sup>*Diseases of Women*. By Ten Teachers. Under the direction of Comyns Berkeley, Obstetrics and Gynecological Surgeon to the Middlesex Hospital, etc. Edited by Comyns Berkeley, H. Russell Andrews, and J. S. Fairbairn. Illustrated. Third Edition. Edward Arnold & Co., London, 1924.

<sup>7</sup>*Cancer de l'Uterus*. Par Jean-Louis Faure, professeur de clinique gynécologique à la faculté de médecine de Paris. Avec 113 figures dans le texte et 4 planches en chromotypographie hors texte. Librairie Octave Doin, Paris, 1925.

<sup>8</sup>*Das Pneumoperitoneum in der Gynaekologie*. Von Dr. Hermann Wintz, Professor und Direktor der Universitäts-Frauenklinik in Erlangen, und Dr. Rudolf Dyroff, I. Assistent der Frauenklinik Erlangen. Mit 5 Abbildungen und 51 Lichtdrucktafeln. Verlag von Georg Thieme, Leipzig, 1924.

<sup>9</sup>*Zur Pathologie und Klinik der Ovarialtumoren*. Von Dr. E. Stübler und Dr. Th. Brandes. Assistenzärzte der Universitäts-Frauenklinik in Tübingen. Verlag von Curt Kabitzzsch, Leipzig, 1924.

Pankow in a short monograph reviews the question of genital tuberculosis<sup>10</sup> in the female. He is averse to operation and advises deep x-ray therapy ( $\frac{1}{10}$  to  $\frac{1}{5}$  H.E.D.) every four to six weeks.

Kidd and Simpson<sup>11</sup> have written a clear-cut, simple and instructive book on the common infections of the female urethra and cervix. The venereal clinic appears of more recent origin in England than in this country and the authors consider themselves pioneers. The main line of treatment consists of daily urethral and vesical irrigations with potassium permanganate solution and frequent intracervical and vaginal applications of a 2 per cent aqueous solution of acriflavin. They claim to have had less than 5 per cent of tubal infections in 650 consecutive cases, an almost incredible record.

Bacteriology, special treatment of arthritis, proctitis, ophthalmia, vulvovaginitis of children, are all considered. The book is useful and to be recommended.

Lipschütz<sup>12</sup> has written a short booklet on *Ulcus Vulvae Acutum* a rapidly developing and extending superficial, painful ulcer of the genitals, not venereal in origin and showing a marked tendency to recurrence. He considers the bacillus crassus, seemingly identical with Doederlein's bacillus, as the etiologic factor. The author's contention is unconvincing both as to the etiology and the clinical syndrome.

The *Report of the Scientific Researches on the Venereal Diseases*<sup>13</sup> contains a very clear, usable and yet short résumé of additions to our knowledge on the culture of the gonococcus, Ducrey's bacillus, and staining of the spirochetes, with other new research articles along similar lines.

The third edition of Wossidlo's *Cystoscopic Atlas*<sup>14</sup> resembles its predecessors. The colored illustrations remain superb and strictly true to nature. Every conceivable cystoscopic picture is reproduced in colors. The short text is well arranged and serves as a running commentary to the plates.

#### OBSTETRICS

The first volume of the second edition of a Handbook of Obstetrics under the editorship of Doederlein<sup>15</sup> has just appeared. The first edition was published in 1915 and aimed to present the advancement in midwifery which had taken place since v. Winckel's monumental work was completed. The present edition is revised by the same authors who wrote for the previous one, except Jung and Veit, who have died in the interim.

The anatomy and physiology of pregnancy (embryology) is dealt with by Graf Spec in a masterly fashion. He expresses no opinion.

<sup>10</sup>*Diagnose und Therapie der Genital Tuberkulose.* Von Professor Dr. O. Pankow, Duesseldorf. Wuerzburger Abhandlungen. Neue Folge, Bd. 1 H. 2 Verlag von Curt Kabitzsch. Leipzig, 1923.

<sup>11</sup>*Common Infections of the Female Urethra and Cervix.* By Frank Kidd, and A. Malcolm Simpson, with additional chapters by George T. Western and M. S. Mayou. Oxford University Press, London, etc., 1924.

<sup>12</sup>*Ulcus Vulvae Acutum.* Von Dr. B. Lipschuetz, Privatdozent an der Universitaet Wien. Mit 23 Abbildungen im Text. Verlag von Leopold Voss, Leipzig, 1924.

<sup>13</sup>*Report of the Scientific Researches on the Venereal Diseases.* Published by the American Social Hygiene Association. New York, 1924.

<sup>14</sup>*Kystoskopischer Atlas.* Ein Grundriss fuer Studierende und Aerzte. Von Dr. Erich Wossidlo. Berlin. Dritte Auflage. Mit 53 Abbildungen im Text und 43 farbigen Tafeln mit Tafelerklaerungen. Verlag von Wilhelm Engelmann, Leipzig, 1924.

<sup>15</sup>*Handbuch der Geburtshilfe.* In drei Baenden und Ergaenzungsband. Herausgegeben von A. Doederlein, Muenchen. Erster Band mit 279 Abbildungen im Texte und 4 Tafeln. Zweite Auflage. Verlag von J. F. Bergmann, Muenchen, 1924.

on the time relation of ovulation and menstruation, while Sarwey completes this subject with the gross anatomy of uterus, placenta and ripe fetus, together with the changes in the entire maternal organism.

Neu treats of the diagnosis of pregnancy, his chapter also being published as a separate monograph. He regards the Abderhalden and phloridzin tests as unreliable. Multiple pregnancies are discussed by F. Weber. Hugo Sellheim, who has done such fundamental work on the mechanism of labor, discusses the physiology of labor in greatest detail entering especially into the physics and mechanics.

Eisenreich has revised the late Jung's chapter on the physiology of the puerperium, v. Pfaundler devotes 300 pages to the newborn, including physiology as well as the diet and care. Eisenreich concludes the volume with the hygiene and diet of the pregnant woman. Numerous references to the literature aid in making the treatise a reference handbook.

The second edition of J. C. Hirst's *Obstetrics*<sup>16</sup> is a short, incisive book such as is needed by the hard pressed third year student in connection with his demonstrations and quizzes. Under these circumstances it is permissible to abbreviate or omit "academic discussion and unproved theories," but the author must remember his responsibilities and weigh each word. Such a loose statement as appears on page 34 that "in the majority of women menstruation and ovulation are practically synchronous" is quite unjustified, just as his personal theory (p. 199) "that every woman is constantly absorbing corpus luteum." When she becomes pregnant the author states the corpus luteum of pregnancy does not "absorb" at once but increases in size! The text and illustrations, the latter judiciously chosen from many sources, are on the whole satisfactory. The latest acquirements such as intravenous dye therapy for sepsis and the Kielland forceps are described.

Hammerschlag has written a textbook on *Obstetric Operations*.<sup>17</sup> A short but very instructive introductory chapter on indications, is followed by detailed description of preparatory operations (interruption of pregnancy, dilating operations, operations enlarging the bony pelvis, version). Nearly 200 pages are devoted to operative delivery. The indications for high forceps are clear-cut and orthodox, demanding engagement of the largest diameter. The Kielland forceps is superior to other models as a rotator of the head, but it is not to be recommended as a universal forceps, nor to be given into the hands of the general practitioner. No new acquirements are noted in cesarean section. The mortality of the trans- and extraperitoneal operations are approximately alike. The mortality of vaginal cesarean section is higher than that of the abdominal operation. The book is a complete guide based largely on Winter's precepts.

Since 1897, Jellett's *Midwifery*<sup>18</sup> has undergone nine editions. As heretofore, it is an exposition of the methods current at the Rotunda

<sup>16</sup>*Manual of Obstetrics*. By John Cooke Hirst, Associate professor of gynecology and obstetrics, graduate school of medicine, University of Pennsylvania, etc., etc. W. B. Saunders Co., Philadelphia, 1924.

<sup>17</sup>*Lehrbuch der Operativen Geburtshilfe*. Von Professor Dr. Sigfrid Hammerschlag, Direktor der Brandenburgischen Hebammenlehranstalt und Frauenklinik in Berlin-Neukölln. Zweite neubearbeitete Auflage. Mit 209 Abbildungen. Verlag von S. Hirzel, Leipzig, 1924.

<sup>18</sup>*A Short Practice of Midwifery*. Embodying the treatment adopted in the Rotunda Hospital, Dublin. By Henry Jellett, Consulting Gynaecologist, Rotunda Hospital, etc., etc. Ninth Edition revised. With 4 colored plates and 263 illustrations. J. & A. Churchill, London, 1921.

Hospital of Dublin and has, in an appendix, statistics from this hospital based on 57,412 cases. For a short treatise Jellett's book is accurate and useful.

Moraes<sup>19</sup> has written a short, elementary, but, yet detailed obstetric propedeutic, which if used in connection with a lecture course, should prove most useful. He stresses the frequency of disturbances in pregnancy quoting Mauriceau's "la grosseesse est une Maladie de Neuf Mois." Much emphasis is placed upon the glands of internal secretion, among which the mammary gland is introduced (?). Few books of its kind show as much familiarity with the world's literature as this volume. The chapter on "biological reactions" is especially complete. Text and illustrations both make this short volume exceptionally acceptable.

Fitzgibbon's Midwifery<sup>20</sup> is really "practical." The emphasis he places on normal labor, which he correctly states composes over 90 per cent of all deliveries, is refreshing. The treatment advised, is most conservative. Present Rotunda methods are described. The simple line drawings are exceptionally instructive.

McNeile's<sup>21</sup> little manual on Pathological and Operative Obstetrics is most attractively gotten up in loose leaf binding. The text is concise, elementary, shows common sense and a conservative attitude.

#### ENDOCRINOLOGY

Gutman has translated the third edition of Weil's book on *The Internal Secretions*<sup>22</sup> in a creditable manner. The treatment of the subject differs from the conventional in that the way is taken up in which each physiologic function is controlled by the action of one or more endocrine glands. I instance as typical chapters the circulation of the blood, respiration and voice production, metabolism, and reproduction. Although many debatable points are described as settled or accepted, the novel method of presentation gives real value to this short treatise and must prove stimulating to all who read it. The author's training as a physiologist has without doubt enabled him to regard endocrine effects from this, to me, seemingly correct angle.

Voronoff<sup>23</sup> describes in a most superficial and sensational manner the most striking results of endocrine disturbances. He then outlines his method of introducing testicular grafts into the scrotum and tunica vaginalis. By placing a third testicle into a growing ram or goat, premature and intensified male characters develop. He next describes rejuvenation of several old bulls who resumed their virile functions after the transplantation, but he repeatedly begs the ques-

<sup>19</sup>*Propedeutica Obstetrica.* Par Arnaldo de Moraes. Docente de clinic obstetrica e assistente da clinica obstetrica da faculdade de medicina do Rio de Janeiro, etc., etc. Illustracoes de Luiz G. Loureiro. Pimenta de Mello & Cia. Rio de Janeiro, 1924.

<sup>20</sup>*Practical Midwifery.* By Gibbon Fitzgibbon, Master, Rotunda Hospital, Dublin. With 175 illustrations. J. & A. Churchill, London, 1923.

<sup>21</sup>*Notes on Pathological and Operative Obstetrics.* By Lyle G. McNeile, Professor of clinical obstetrics, College of Medical Evangelists, Los Angeles; Senior attending obstetrician, Los Angeles County Hospital, etc. Lefax, Incorporated, Publishers, Philadelphia, 1924.

<sup>22</sup>*The Internal Secretions.* For the use of students and physicians. By Dr. Arthur Weil, assistant professor of physiology, University of Halle. Authorized translation of third German edition by Jacob Gutman, M.D., etc., director Brooklyn Diagnostic Institute. The Macmillan Co., New York, 1924.

<sup>23</sup>*Greffe Animale, ses applications utilitaires au Cheptel.* Par le Dr. Serge Voronoff. Directeur du laboratoire de chirurgie expérimentale du collège de France, etc. Avec 59 planches dans le texte. Librairie Octave Doin. Paris, 1925.



tion as to whether they again became useful as propagating stud animals. This pamphlet is interesting, suggestive but very far from convincing.

Smith and McClosky<sup>24</sup> using a modification of Dale and Laidlaw's method, described the preparation of a stabile, infundibular powder to be used as a standard for the oxytoxic and pressor principle contained in the pituitary body. They also describe methods of preserving infundibular extracts.

#### MISCELLANEOUS

Fitzwilliams has written a clear-cut, simple and instructive treatise *On the Breast*.<sup>25</sup> The title, as well as the text, are typically English in the best sense of the word, the clinical side of the subject being emphasized by numerous short, epitomized case histories. Considerable attention is devoted to congenital abnormalities and curiosities. Inflammatory lesions of every variety are described. The last half of the volume is devoted to neoplasms. The author fully endorses the modern practice of removing any tumor of the breast as soon as discovered. He inclines toward radical removal in duct and cyst papillomata. The clinical aspects of cancer of the breast are described in great detail. The radical operation advocated resembles the Willey Meyer modification of Halstead's technic. It is to be regretted that the steps of the operation are not illustrated sufficiently. Fitzwilliams is disappointed with the effect of postoperative x-ray treatment. Short, useful bibliographies conclude each chapter.

The medical profession has become fully aware of the value of basal metabolism studies. The development of simple, clinical apparatus has popularized the method. DuBois'<sup>26</sup> monograph is designed as a guide for the practitioner and student. Anyone with good knowledge of physics and chemistry can understand the presentation which is concise and clear. For research laboratories the Tissot spirometer or Benedict Universal is recommended; for hospital work the Benedict-Collins is suggested. The concluding chapter deals with the effect of disease on the metabolic rate.

Rollier<sup>27</sup> reviews his monumental work on the heliotherapy of tuberculosis in this second edition of his monograph. In the historical review he most modestly lays claim to no priority in this field. At present he controls the enormous number of twelve hundred beds, divided among thirty-four clinics which are situated at elevations of 1250, 1350 and 1500 meters.

Especially good results have been obtained in spondylitis, coxitis and other joint lesions, also in peritoneal and gland lesions. This monograph is a veritable mine of information on all aspects of heliotherapy.

<sup>24</sup>Treasury Department Hygienic Laboratory. Bulletin No. 133, April 1924. By M. I. Smith and Wm. T. McClosky, II Some Factors Concerned in the Deterioration of Pituitary Extracts. Washington, 1924.

<sup>25</sup>*On the Breast*. By Duncan C. L. Fitzwilliams, Surgeon in charge of out-patients and lecturer on operative surgery at St. Mary's Hospital, etc., etc. C. V. Mosby Co., St. Louis, 1924.

<sup>26</sup>*Basal Metabolism in Health and Disease*. By Eugene F. DuBois, M.D., Medical Director, Russell Sage Institute of Pathology, etc. Lea & Febiger, Philadelphia and New York, 1924.

<sup>27</sup>*Die Heliotherapie der Tuberkulose*. Von A. Rollier. Zweite vermehrte und verbesserte Auflage. Mit 273 Abbildungen. Verlag von Julius Springer, Berlin, 1924.

Whether it is because Gray's Anatomy<sup>28</sup> was the first textbook through which I approached the subject of anatomy, or because of a certain simplicity, clearness and lack of pretentiousness which pervades its pages, is hard for me to decide. For long years it has remained my favorite. I can still say this of this new twenty-first edition which has just appeared, under the editorial guidance of Warren H. Lewis. No startling changes have been made, but the book has been kept up-to-date. However, I suggest that new and adequate illustrations for the female pelvic organs may grace a subsequent edition, and that, until further proof is obtained, the spleen be omitted from the group of ductless (i. e., endocrine) glands.

The first volume of a three volume *Clinik of Malignant Tumors*<sup>29</sup> has just appeared under the editorial supervision of Zweifel and Payr. The editors, in their introduction, strike a somewhat apologetic note, unnecessarily so it appears to me, because the purpose of the work—to be a trustworthy guide to the general practitioner, a book of reference to the surgeon and to help in the campaign for the early recognition of cancer—is well worth while.

This first volume contains a chapter on the pathology of tumors by Max Borst. Tumors of the skin are dealt with by Delbanco and Unna. The remainder is taken up by all varieties of tumors of the head (skull, brain, eye, ear, nose, pharynx, mouth, larynx, parotid, thyroid and carotid gland, branchiogenetic growths and tumors of nerves) written by well-known surgeons among whom I mention Payr, Küttner, Pette, Sattler, Knick, Partsch, Kocher and the late Hermann Heinicke.

A more detailed review will be called for when this series is completed. The work promises to be of great value.

The final volume of Pfaundler and Schlossmann's *Handbook of Pediatrics*<sup>30</sup> has appeared. Noeggerath deals with the urogenital diseases and, together with Eckstein, also with the adrenal system. Organic nervous diseases are described by Ibrahim, functional nervous troubles by Gott, the meninges by Mendelsohn. The concluding article on diseases of the joints is contributed by Husler. A detailed index completes this book, which in the compass of its four volumes includes the newest knowledge on pediatrics in most comprehensive and authoritative fashion.

Mme. Greyfié de Bellecombe<sup>31</sup> has written an elementary textbook, dealing with the hygiene, and nourishment of the newborn and infant. Mother's milk as the best and safest food is stressed but substitutes are described in detail. The directions given are most detailed and specific, so as to be of use to both practitioners and mothers.

The *Child Health Library*<sup>32</sup> consists of ten very small booklets

<sup>28</sup>*Anatomy of the Human Body*. By Henry Gray. Twenty-first edition, thoroughly revised and re-edited by Warren H. Lewis, Professor of physiological anatomy. Johns Hopkins University, Baltimore. Illustrated with 1283 engravings. Lea & Febiger, Philadelphia, 1924.

<sup>29</sup>*Die Klinik der Boesartigen Geschwulste*. In drei Bänden. Herausgegeben von Geh. Rat Professor Dr. P. Zweifel and Geh. Med. Rat Professor Dr. E. Payr. Erster Band. Mit 204 Textabbildungen und 33 farbigen Tafeln. Verlag von S. Hirzel, Leipzig, 1924.

<sup>30</sup>*Handbuch der Kinderheilkunde*. Herausgegeben von Professor Dr. M. von Pfaundler in München, und Professor Dr. A. Schlossman in Duesseldorf. Vierter Band, dritte Auflage. Mit 8 Tafeln und 163 Textfiguren. Verlag von F. C. W. Vogel, Leipzig, 1924.

<sup>31</sup>*Pratique de l'Alimentation et de l'Hygiène du Nourisson*. Par Mme. P. Greyfié de Bellecombe. A. Maloine & Fils, Éditeurs, Paris, 1924.

<sup>32</sup>*Child Health Library*. A series of ten books. Edited by John C. Gebhart. Published by Robert K. Haas, Inc., New York, N. Y., 1924.

which cover prenatal care, the treatment of baby and school child and various phases of child hygiene both mental and physical.

There is always much of interest in the report on public health of the surgeon general's office<sup>33</sup>. Measles increased in the period covered. Smallpox still shows an incidence of more than 30,000 cases (a sad commentary on state inefficiency). Tuberculosis and typhoid fever continue to show a gratifying decrease. The average length of life in the U. S. is now fifty-six years. A number of diseases are being studied. Among them pellagra, malaria, diphtheria and goiter may be mentioned. Many laboratory investigations—bacteriologic, pharmacologic and zoologic—are under way. The supervision of the water supplies furnished by common carriers is important. The division of foreign and insular quarantine, as heretofore, makes a separate report. A huge mass of information, in most condensed form, is found between these covers.

The third volume of the *International Clinics*<sup>34</sup> contains several good papers on malaria. The Dick test and active immunization against scarlet fever is of great importance (A. Zingher).

In the fourth volume<sup>35</sup> of the same series, articles on granuloma inguinale (F. M. Johns), Vincent's angina (M. W. Perry) and insulin (Banting) are especially interesting.

Oelze has written a short, well illustrated nontechnical booklet dealing with all phases of the microscope and its accessories.<sup>36</sup> This pamphlet will prove of use to those contemplating the purchase of an outfit for microscopy.

Lay's *A Plea for Monogamy*,<sup>37</sup> for which the publishers urge "that it be sold only to adults," is a brilliantly written book, which, however, I must confess, I was unable to read through. The book is written to show what makes thousands of unhappy married women restless and discontented. The author states that emotions today are no more complex than they were many thousands of years ago. His remark, that men and women with perfectly normal love life, feel no need whatever to talk about it, is absolutely true and well worth bearing in mind. He claims that the real happiness of marriage depends *solely* on the behavior of the husband, a claim to which many "erotologists"—the word is of Lay's coinage—may perhaps take exception. As a plain gynecologist it appears to me that the author greatly exaggerates the importance of what he terms "satisfactory erotic technic." When he remarks that it is a question whether sex problems can ever be permanently solved, he treads on firmer ground. Their solution will certainly not be brought about by such a book as this.

<sup>33</sup>Annual Report of the Surgeon General of the Public Health Service of the United States. For the fiscal year 1924. Government Printing Office. Washington, 1924.

<sup>34</sup>International Clinics. Volume III, Thirty-fourth Series, 1924. J. B. Lippincott Company, Philadelphia, 1924.

<sup>35</sup>International Clinics. Volume IV. Thirty-fourth Series. 1924. J. B. Lippincott Company, Philadelphia, 1924.

<sup>36</sup>Die Mikroskopische Ausrüstung des Arztes. Von F. W. Oelze, Privatdozent fuer Dermatologie an der Universitaet Leipzig. Mit 126 Abbildungen im Texte. Verlag von Leopold Voss, Leipzig, 1924.

<sup>37</sup>A Plea for Monogamy. By Willard Lay, Ph D. Boni and Liveright. New York, 1924.

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